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NATIONAL PETROLEUM NEWS

Volume 34 | August 26, 1942 | Number 34

NEWS BRIEFS

Nelson names Ickes, Henderson, Patterson to study fuel oil rationing on East Coast. Page 15.

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OPC approves 100-mile trans-Ohio pipeline. Page 15.

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OPA cuts tire quotas for last quarter. Page 15.

* * *

Tire "sandal" offers 3000 more tread miles. Page 4.

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Repeal of Louisiana's Sunday closing law sought. Page 4.

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U. S. "gas" demand drops 11% in June, Bureau says. Page 3.

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More ration books stolen from OPA boards. Page 10.

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Rail hauls to East reach 830,820 b/d. Page 10.

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OPC hikes September oil quotas 28,000 b/d. Page 18.

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Texas governor names lawyer to fill Sadler post. Page 18.

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Claims "selfishness" blocked "alky-rubber". Page 17.

* * *

Tariff Commission begins new crude cost survey. Page 20.

* * *

Lake carriers to link two pipelines temporarily. Page 24.

* * *

ODT sets up unit to issue waterway haul permits. Page 25.

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Synthetic acetone, butyl alcohol get new "ceilings". Page 17.

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. . . *See page 28*

Clamor for Single Oil Chief Mounts

WASHINGTON—Growing clamor for centralized control—generally by OPC—over oil industry's wartime operations breaks out at joint OPC-WPB-ODT-OPA meeting here. Appointment of 3-man committee to determine "need" for fuel oil rationing is seen as a further encroachment on Ickes' authority. Page 3.

Ban Midwest Haul Of 'Gas' via Rail

WASHINGTON—OPC bans tank car gasoline shipments in 20 mid- and southwestern states to free 5000 to 7000 tank cars for eastern service. Action, taken in Directive No. 57, will not necessarily be followed by mid-west rationing, says Mr. Davies. Page 21. Effect of directive studied. Page 3.

OPA Ruling Curbs Group 3 'Ceilings'

WASHINGTON—An interpretation by OPA of Price Schedule 88 which prohibits establishing price ceilings on a Group 3 basis unless shipments actually came from an Oklahoma refinery and were shipped f.o.b. Oklahoma, is revealed. Ruling was teletyped to OPA offices without publicity. Page 3.

OPA Alters Basis On Crude 'Ceiling'

WASHINGTON — Ceiling prices on crude "at the receiving tank" in place of "at the well" are effective Aug. 26. OPA revised crude price ceilings in Amendment 30 to Price Schedule 88, saying the former method of determining maximum prices resulted in "wasteful duplication of storage facilities". NPN gives text. Page 18.

Rationitis

Oil industry hates it, public would like (and tries) to "beat" it—that's the report on rationing by an NPN staff writer who spent several days roaming around western New York to give NPN readers a first-hand account of oil's operations after one month of "rationitis". An uninitiated western oil man, this writer reports, would see some strange things. Page 29.

BULLETINS

BARGE CONVERSION

WASHINGTON—Shortage of Diesel engines has forced a delay in the big government barge expansion program which originally called for construction of about 900 wooden barges and conversion of 250 steel barges for oil service.

WPB requirements committee said it would be all right to convert the steel barges, but could not see its way clear to approve materials for towboats. Lack of boats impedes plans to carry out program, but officials believe existing power equipment is sufficient to warrant conversion of half of the steel barges which would increase capacity by 1,250,000 bbls.

FUEL OIL SUPPLY

WASHINGTON — OPC expects light fuel oil deliveries to East Coast this winter to be sufficient to supply 75% of "normal" requirements, or 90% of last winter's requirements which were lighter than "normal", a meeting of New England governors and congressmen was told late Aug. 25.

TEXAS COMMISSIONER

AUSTIN—Beauford Jester officially became a member of the Texas Railroad Commission today when he took the oath of office in the Capitol's House Chamber.

Lieut. Jerry Sadler, whose place Jester is taking, did not appear nor has he yet instituted any court proceedings to prevent Jester from taking office. (See earlier story, p. 18.)

ARTIFICIAL GAS

WASHINGTON—Artificial gas deliveries to new industrial and domestic consumers has been restricted by WPB Order L-174 designed to cope with gas shortages expected this winter.

Jersey Testimony Hits D. J. Charges At Bone Hearings

WASHINGTON—Heated accusations which almost lead to a fist fight would up Jersey Standard's testimony before Senate patents committee, where Jersey President Farish and other company witnesses presented a "we-are-proud-of-it" explanation of patent deals with the German I. G. Farbenindustrie. Claimed Jersey: U. S. got more than the Nazi out of the company's dealings with I. G. Page 5.

A number of processes for war products now in use by United Nations, forces are possible because of Jersey Standard-I. G. Farbenindustrie deals, Jersey witnesses testify, listing oil hydrogenation for toluol and 100-octane gasoline and aviation lube oil additives among others. Page 16.

Emphasis Swings To 'Quick' Rubber

WASHINGTON—More and more emphasis is on "quick" rubber, produced in converted refining facilities, as materials shortage tightens. Cancellation of the Gary, Ind., synthetic rubber project lends weight to reports that more than half the "permanent" butadiene projects may be cancelled. Page 17.

General News 3
Washington News 5
The Editor's Page 11
Refinery Management News 16
Production News 18
Transportation News 20
'Rationitis' 29
Statistics 37
Markets 39
Personals 48

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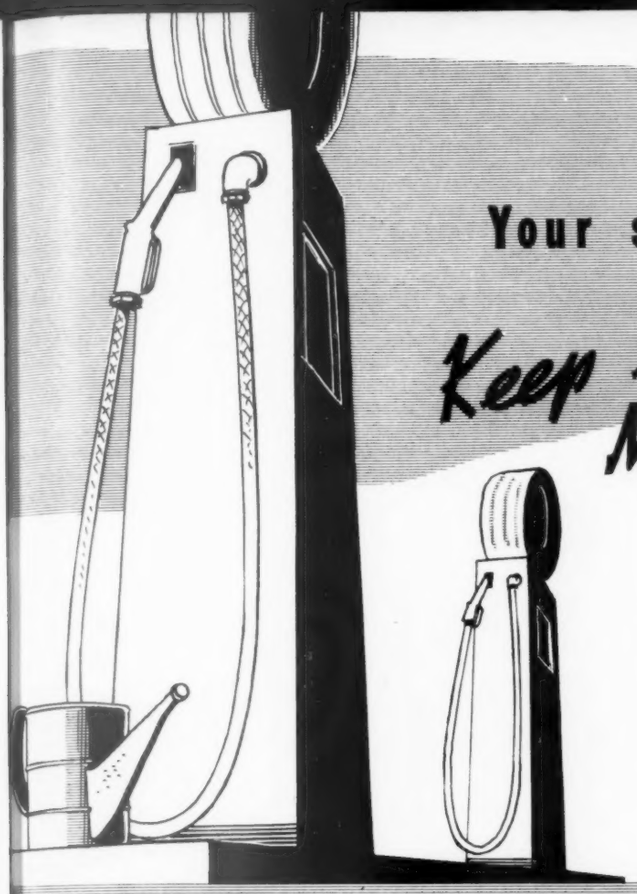

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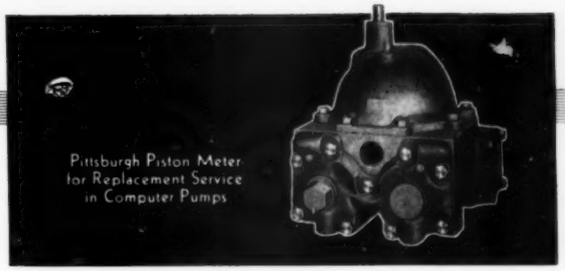

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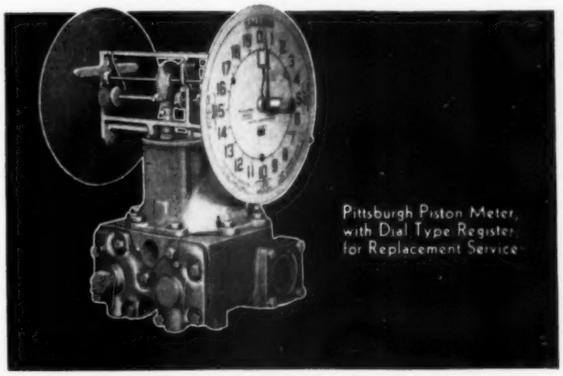

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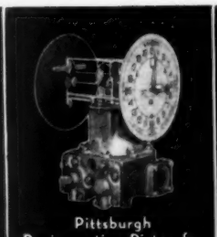
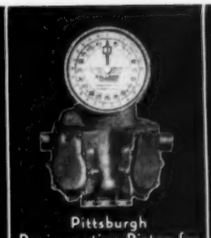

Pittsburgh Reciprocating Piston for Service Station Pumps


Pittsburgh Reciprocating Piston for Tank Trucks, Bulk Plants

Pittsburgh Grease for Lube Buckets

Pittsburgh Disc for Refinery and Industrial Services

THE WORLD'S LARGEST MANUFACTURER OF GASOLINE, OIL, AND GREASE METERS

Starr Rodgers, P.I.W.C. Synthetic Rubber Chief, Praises Oil Technologists for 'Quick' Program

Texaco's President W. S. S. (Starr) Rodgers, as chairman of the Petroleum Industry War Council's Synthetic Rubber Committee, has watched from the "inside" as the oil industry rapidly converted its refining facilities for the "quick" production of butadiene and more than half a dozen other products needed for war. He has high praise for the men who have directed and carried out the program, and looks upon their accomplishments, plus the "unselfish cooperation" of both large and small members of the oil industry, as a vital contribution to the nation's war effort.

"Through the medium of your publication," Mr. Rodgers said in a letter to NPN last week, "I wish to take this opportunity on behalf of the Synthetic Rubber Committee and myself to express to the Office of the Petroleum Coordinator for War and particularly to Mr. Wright Gary our appreciation for the splendid job they have done on this program. Although the task of the technical men is far from finished, as they are still cooperating with the OPC and refiners throughout the country, I wish to compliment Dr. T. G. Delbridge and members of the Technical Advisory Committee to the Synthetic Rubber Committee, who have done a great deal of hard work and who have devoted much of their time to the successful accomplishment of the technical phases of the program. Also, I congratulate the members of the industry, both small and large, on their unselfish cooperation. I am confident this work will add materially to the many contributions of the Oil Industry to the country's war effort."

While the technical men—OPC's refining staff and the Technical Advisory Committee—have been involved in processes and engineering problems, the Synthetic Rubber Committee and Mr. Rodgers have been busy with the management and executive details of putting the program in full swing.

Mr. Rodgers, who has been president of The Texas Co. since 1933, has a scientific background. Graduated from Sheffield Scientific School, Yale University in 1907, he first entered mining, and with a few years experience in this industry, became an oil man when he joined a producing company during the early days of the Midway Field, Kern County, Calif.

During his first ten years with Texaco, Mr. Rodgers held various positions in the company's refining department. He was appointed assistant to the president in 1926, and became vice-president in charge of domestic sales in 1928. He was a member of Texaco's executive committee during the three years preceding his election as president.

NATIONAL PETROLEUM NEWS

VOLUME 34 WEDNESDAY, AUGUST 26, 1942 NUMBER 34

Study Effect Of Directive On Tank Cars

NPN News Bureau

CHICAGO — Everyone asks the same question: What's the effect of the tank car gasoline shipment ban?

OPC's Directive 57, halting rail shipments of gasoline in 20 Mid- and Southwestern states hit suddenly. In answer to a flood of inquiries, Indiana Standard issued this statement:

"Mr. Ickes' order will compel drastic revision of methods of distributing gasoline over long distances in the Middle West. It will speed up conversion from tank cars to other forms of transportation. Although many parts of the Middle West are already being served only by trucks, pipelines or barges, there are still extensive territories in the Dakotas, Minnesota, Upper Michigan and elsewhere which are still dependent on rail hauling.

"It will be impossible to provide other means of transportation to such points by Aug. 24. It is entirely possible that some bulk plants will run dry before new methods of supplying them can be worked out.

"As to whether adjustments can be made by which the supplying of gasoline in the Middle West can be continued on the present scale without use of tank cars only time will tell. The order provides exceptions for war industries and agricultural territories, which may save the situation so that serious shortages will not develop.

"The Middle West has been rationing itself to a considerable extent voluntarily. We are hopeful that this may continue on a scale which will enable this part of the country to help supply the rationed East without causing any real hardship here."

Effects of Ban

Certain general facts stand out. It appears likely that the directive will:

1—Open new source of supply for independent East Coast jobbers who have been knocking unsuccessfully on the doors of mid-western refiners and marketers for some time.

2—Dry up some sources of supply for mid-western marketers who have

(*Continued on page* 4)

Chicago Oil Men Urge FDR To Give Ickes Power

NPN News Bureau

CHICAGO — President Roosevelt was petitioned Aug. 20 to centralize wartime authority over the oil industry in Petroleum Coordinator Ickes.

The action was taken by the Chicago Petroleum Jobbers Assn., which stated it believes OPC has a broad understanding of the oil industry's problem and that OPC personnel is both skilled and practical in dealing with those problems.

Chicago Petroleum Jobbers Assn. is a local organization of wholesale handlers of major oil products only. Officers are O. L. Peterson, Geo. Peterson Co., president; Sam Erlich, National Gas & Oil Sales Co., secretary; Harry Beck, Frank M. Fulton, Inc., vice-president.

Basis of Group 3 As 'Ceiling' Price Narrowed by OPA

NPN News Bureau

WASHINGTON—OPA has interpreted Schedule 88 to mean that a refiner cannot use trade journal quotations for Group 3 as his "ceiling" prices except when the products come from an Oklahoma refinery and when the sales are actually FOB a refinery in Oklahoma.

This ruling, which may mean drastic changes in price policies for many refiners, was in the form of an interpretation teletyped to OPA regional offices on July 29.

It was not released by OPA headquarters at that time.

Here is the supposed background for issuance of this interpretation:

Some Mid-Western jobbers, spot buyers, have complained that their sources of supply—independent refiners, brokers, etc.—have cut them off, preferring to sell to East Coast buyers and others at OPA "ceiling" prices which were determined by the "low" of published quotations FOB Group 3 last October.

These refiners are said to have had no posted price of their own

(*Continued on page* 14)

Clamor for Single Oil Chief Aired at War-Agency Confab

NPN News Bureau

WASHINGTON — President Roosevelt hasn't yet announced his decision on Mr. Ickes' request for primary authority over the oil industry for the war's duration, but the feeling is growing—it is almost a certainty now—that, if the President doesn't "come through", Mr. Ickes will step out of the oil picture.

Such things as WPB Chairman Nelson naming a 3-man board to decide whether fuel oil rationing was "necessary" in the East—instead of letting Mr. Ickes decide—are further indications of encroachment on OPC's jurisdiction.

On the 3-man board with Mr. Ickes, besides Leon Henderson, is Undersecretary of War Patterson who, with Mr. Henderson, has been among the most rabid rationers (for civilians) in the administration. Both have long favored measures to restrict automobile use.

Consumer Pressure

Eastern consumers, especially in New England, are "putting on the heat" for centralized oil control. Their newspapers are campaigning for it. Senators and congressmen have gone to the White House about it. And they all, apparently, want Mr. Ickes to take charge.

These demands were reiterated at a meeting Aug. 25 of New England governors, senators and congressmen here with WPB Chairman Nelson, ODT Director Eastman, OPA Chief Henderson and Deputy Petroleum Coordinator Davies.

Horace T. Cahill, representing the governors of Massachusetts, New Hampshire and Vermont, urged appointment of a "National fuel administrator with complete authority". Such administrator should also have representatives in each state, he added.

Wants a 'Judge Landis'

Mr. Cahill also said that the oil industry should have a "Judge Landis" (baseball czar), suggesting Wendell Willkie or Joe Kennedy. Either one might be available, he added.

Sen. Lodge, Mass., was another who spoke about the confusion resulting from lack of coordinated authority to cope with oil problems.

Some speakers didn't hesitate to say they thought that "personalities" had entered into the situation.

Henderson Is Miffed

Mr. Henderson was obviously miffed at the meeting being open to newspapermen. He had little to say, except that the petroleum supply situation was becoming increasingly worse.

Mr. Nelson was noncommittal, saying that there was "no lack of coordination or authority". He said WPB had all authority required, adding that it was only a question of finding the solution to various matters.

Ickes Still at Shangri-La

Mr. Ickes' whereabouts is still undisclosed, but he is expected back the first week of September when the Petroleum Industry War Council meets.

The more-power-for-Ickes move may have top billing on agenda of the P.I.W.C. when it meets. Some industry leaders believe that the war council should go to the White House on the matter.

June 'Gas' Demand Dips 11%—Bureau

NPN News Bureau

WASHINGTON—Curtailed gasoline deliveries into District 1 (under L-70) combined with tire conservation in District 2 resulted in a drop of 11% in the total U. S. motor fuel demand during June, Bureau of Mines reports.

Curtailed gasoline deliveries was credited as "the paramount factor", with tire conservation next.

For the first time in months, stocks of finished and unfinished gasoline fell below the corresponding period of the preceding year. Total finished and unfinished stocks were 87,517,000 bbls. on June 30, 1942.

Daily average crude runs to stills were 3,513,000 bbls., or 65,000

(*Continued on page* 14)

NATIONAL PETROLEUM NEWS—August 26, 1942—Vol. XXXIV—No. 34

Published every week at 1213 West 3rd St., Cleveland, Ohio, U.S.A. Subscription rate $5.00 per year in United States, Mexico, and Pan-American countries; $6.50 Canada and foreign countries. Entered as second class matter Jan. 17, 1910 at Cleveland, O., post office under act of March 3, 1879, by The National Petroleum Publishing Co.
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Study Effect Of Directive On Tank Cars

(*Continued from page 3*)

no contracts or other definite periodical commitments, thus limiting the amount of materials available to them.

3.—Greatly increase mid-western refiners' local market by diversion to the East Coast of tank car shipments from Group 3, which heretofore have been coming into the Midwest.

4—Stretch to the limit truck transports, causing them to go far beyond 100-mile hauls.

With few exceptions, mid-western refiners and marketers have disregarded the recent persistent flood of inquiries from the East Coast independent jobbers. They have had an avid home market for all products they could get, and still have. However, Directive 57 prohibits tank car shipments within District 2, and the marketers, particularly, are digging the old East Coast jobber inquiries out of their files for follow up as gasoline can still be moved eastward by train.

Inquiries Followed Hike

"When the East Coast price ceiling for gasoline was pierced by OPA's increase of 2.5c per gallon on June 27," one marketer said, "we quickly piled up orders for 500 cars a month and were shipping at that rate; but as soon as a hint reached the Eastern jobbers that the increase might be wiped out, they made requests for privilege of cancellation. All but about 10% of the business was cancelled when the price dropped down. It happens we have a small fleet of big transports, so have been paying less attention to eastern jobber inquiries lately."

That marketer was an exception. Other marketers report receiving from 6 to 8 inquiries weekly, but have paid no attention to them. However, one such marketer immediately switched his view upon hearing of Directive 57. He began pulling the old inquiries out of his file for follow up.

"The matter of 2.5c extra price in June and July on the East Coast made no difference to us," this man said, "except it temporarily stimulated the number of inquiries we received. The buyer paid the freight, and any profit difference there might have been, he stuck in his own pocket. The trouble with shipments East, we seldom got our cars back."

All output of mid-western refiners moving eastward has been going to major companies, according to a refinery survey just completed. They have paid no attention to independent eastern jobber inquiries.

"What's happening to the independent East Coast jobber?" an independent refiner was asked.

Moves to Majors

"You tell me!" he shot back. "I'd like to know. He has been important in the past, but in time of stress like now, it's a matter of quickest delivery of the largest volume possible and we ship only to majors. I hope they are taking care of the little fellow in District 1." They should be."

Some refiners state they are answering all East Coast jobbers inquiries with form letters advising they already have commitments for all products.

"Why should we worry with small shipments of 1 or 2 cars?" one asked. "All we have to do with the majors is ship everything we have and mail them a confirming order. No credit worry—and we get our tank cars back promptly, too! None of them pirated."

However, not all the eastern independent inquiries are so small. "We had one inquiry for 11,000,000 gallons of fuel oil," one large marketer said. "But we are shipping only to majors."

"A man came in here wanting to buy 2,000,000 gal. of No. 2 straw," said a refiner. "It was for delivery 1 or 2 cars a day. Another inquiry was for 70 to 80,000 barrels of fuel oil for delivery over the balance of 1942, but a major offered us the same price and we sold to him."

Discussing the possible effects of Directive 57, a Chicago refiner said: "Up until now we have been shipping gasoline by tank car to Milwaukee. From here on we use trucks and divert the tank cars to hauling fuel oils to the East. The order stopping rail shipments of gasoline from Oklahoma to here will widen our area and increase the demand on us, which is an opportunity for greater service in home territory. We get our crude from major companies and our eastern shipments will in turn go to them."

Chicago Oil Men to Golf

NPN News Bureau

CHICAGO — The annual fall golf party of the Chicago Oil Men's Club will be held Sept. 17 at the Brookwood Country Club according to L. C. Denning, secretary of the organization. Program arrangements are being handled by M. W. Prellberg of the James B. Berry Sons Co. and W. G. Franke of the American Mexican Petroleum Corp.

Louisiana Repeal Of Sunday Closing Sought in 2 Bills

Special to NPN

NEW ORLEANS—Two separate bills seeking repeal of Act 228, the Louisiana Sunday service station closing law, have been introduced in the first 5 days of the special session of the Louisiana legislature. Both bills are sponsored by the Sam Jones administration, and one was favorably reported (13 to 1) by the House ways and means committee.

The special session has been called to attempt to increase the state's revenues and meet shortages which may result in the closing of the New Orleans Charity Hospital, one of the largest in the world. One of the major revenue losses has been in gasoline taxes because of tire rationing. Administration spokesmen say the Sunday closing law aggravates this situation.

Shreveport Test Case

Meanwhile, gasoline interests and the public are watching closely for the outcome of the test case in Shreveport, where 4 large gasoline retailers have sought an injunction restraining the mayor and police chief of that city from enforcing provisions of Act 228.

Should the legislature pass either of the two bills seeking repeal of Act 228, however, the Shreveport proceedings would be dropped, as well as charges brought against a New Orleans retailer arrested Aug. 16 for alleged illegal gasoline sales on that date.

Ohio Governor Names Group To Study Oil Supply

NPN News Bureau

CLEVELAND — Ohio's Gov. John Bricker has named a committee to "obtain the facts regarding the petroleum supply situation in Ohio". Eric V. Weber, Cincinnati, president of Eureka Oil Co., is chairman.

Purpose of the committee, according to some members, is to obtain facts on the supply situation with which to battle imposition of gasoline or fuel oil rationing in Ohio and to study tire conservation and highway use.

Committee members are: A. A. Stambaugh, Cleveland, vice-president, Ohio Standard; G. R. Fenner, Columbus, Pure Oil Co.; Hugh D. Pallister, Cleveland, gasoline retailer; Paul Deer, Springfield, Bonded Oil Co.; L. A. Taylor, Columbus, Ohio Farm Bureau; Frank E. Kirby, Columbus, Ohio Assn. of Commercial Haulers; J. Russell Lloyd, Columbus, Ohio State Automobile Assn.; and John Wieland, Cleveland, Ohio Standard advertising manager.

Humble Gets Army-Navy 'E'

Special to NPN

HOUSTON — The Army and Navy E pennant "for high achievement in the production of war equipment" was hoisted at the Humble Oil Co.'s Baytown refinery Aug. 20. The spectators numbered over 5000.

The award to the Humble company—the first such award given an oil company in the nation—signified Humble's achievement in the manufacture of toluene.

Tire 'Sandal' Offers 3000 More Miles

NPN News Bureau

NEW YORK—A "tire sandal" is the answer of the U. S. Rubber Co. as motorists worry about bald-headed tires. The "sandal," made of cotton dipped in an asphalt emulsion, will give from 2500 to 3000 extra miles of wear, according to tests conducted by the company.

Resembling a stitched bath mat, the carpet-like material is fitted over the outside of tire casings and the asphalt emulsion treatment is given to combat wear and the elements.

U. S. Rubber's production plans contemplate manufacture of the "sandals" in popular passenger car tire sizes. Further development will be conducted to obtain a material suitable for use on light delivery trucks. The cotton pile fabric can be produced in unlimited quantities, according to the company.

For efficient use of the "sandals," driving speed should be held to 30 m.p.h. and tires should be kept inflated to 40 lbs.

How tire "sandal" is applied to casing

NPN Reports

War Oil News and War Orders from

WASHINGTON

For ALL branches of the Oil Industry

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Jersey-I.G. Patent Deal Gave U. S. Edge On War Processes, Senate Committee Told

By A. M. PETTY, NPN News Editor

WASHINGTON—New Jersey Standard presented a "we-are-proud-of-it" explanation of its 1929 patent deal with I. G. Farbenindustrie, of Germany, at Senate Patents Committee hearings on Aug. 19, 20 and 21.

But it was more like defense testimony at a trial than a hearing. Or rather a "retrial"—a retrial of justice department's anti-trust case that was supposedly settled out of court by the March 25, 1942, consent decree.

W. S. Farish, president, heading the Jersey witnesses, again denied charges of entering into a "cartel" with the German I.G. He said the patent deal had resulted in developing 100-octane gasoline, Buna rubber, synthetic ammonia and other war products for the U. S. He surprised the "prosecution" with a State Department document backing up his statement that Jersey had supplied Axis airlines in Brazil under instructions from the U. S. ambassador.

Arnold Has New Technique

The committee's hearings are on patent law changes. But there is a suspicion that Thurman Arnold, assistant attorney general, is using the hearings as part of his new anti-trust technique.

Since President Roosevelt banned anti-trust lawsuits for the duration (when likely to interfere with war production), Mr. Arnold can't go to the courts. But he can go to Congress, especially if "invited". And the evidence gets into the public record (and the newspapers) just the same.

First 'Tried' by Truman

The Standard-I.G. case was first "tried" before Sen. Truman's defense investigating committee last spring.

On March 26, the day after the consent decree was entered in court, Mr. Arnold appeared before the Truman Committee with a 13,000-word statement. It was based on "evidence" taken from Jersey's files for the court trial which was never held.

About two months later, R. M. Hunter, one of Mr. Arnold's men, was "subpoenaed" before the Senate Patents Committee. He came with a bushel of documents from Jersey's files on the I.G. deal. He developed in more detail Mr. Arnold's charges made before the Truman committee. Later, Irving Lipkowitz and Patrick Gibson, also from the anti-trust division, developed other angles of the case.

When the Jersey witnesses came before the Senate Patents Committee to present their rebuttal, they found these same three attorneys from the justice department seated close behind the committee members.

Throughout the 3-day hearing, these justice department men would jump up and whisper in the ears of Senator Bone, Washington, the committee chairman, or of Creekmore Fath, the committee counsel. Other times they would pass them pencilled notes. At their feet were bulging briefcases—photostats, papers and other data.

Presumably, the justice department men were suggesting questions to ask the Jersey witnesses as some bit of testimony seemed to catch the committee chairman and counsel unaware. And reports were that the justice department men met with the committee counsel after the hearings to prepare for the next day.

Jersey Is Aggressive

Jersey's presentation was calm but aggressive throughout. At the outset, Mr. Farish's remark about a "one-sided" hearing, to date, drew fire from Chairman Bone. And the hearing closed with R. T. Haslam, Jersey vice-president, nearly coming to blows with a justice department attorney (Mr. Hunter) after the latter had accused some of the Jersey witnesses of "deliberate misstatements of fact". (Mr. Hunter later withdrew this remark from the printed record.)

All of the Jersey witnesses seemed to have their backs up, though their manner was most deferential. The steel showed through in their voices sometimes. But, for the most part,

Tense Scene as 'Deliberate Misstatement' Charge Angers Jersey Men

R. T. Haslam (left) starts after the Justice Department attorney who has just accused some New Jersey Standard witnesses of "deliberate misstatements". On Mr. Haslam's left is W. S. Farish, then E. V. Murphree. In background, left to right, are Stephen Walter and Earl Newsom, Jersey public relations representatives, and Edward F. Johnson, general counsel. NPN's photographer snapped this tense scene from directly behind the committee table

they spoke in calm, deliberate tones. They insisted—despite any interruption—on getting their views into the record. They challenged even the slightest inference that Jersey's deal with I.G. had hampered this country's war effort.

Ended Relations in 1939

Justice department — and the Bone committee—had sought to show that Jersey's relations with I. G. continued for many months after outbreak of the war in September, 1939.

Jersey's contention is that the so-called Hague memorandum, drawn up by Mr. Howard and I.G. representatives in latter part of September, 1939, ended all joint efforts with the German firm.

Jersey at that time bought out I.G.'s 20% interest in the Standard-I.G. company (which held the oil and coal hydrogenation patent rights outside of Germany), terminated the JASCO agreement (joint development company) and took over Buna rubber patents for U.S. and the French and British empires.

What remained was simply details having to do with transfer of patent titles and settlement of royalty agreements, Mr. Howard said.

Jersey Witnesses Listed

Jersey's main presentation was a lengthy statement by Mr. Farish. Interspersed was more direct testimony by technical men who participated in actual negotiations with I.G. or else worked on processes obtained from the German firm.

These were: R. T. Haslam, Jersey vice-president, who went to Germany and came back recommending purchase of the oil hydrogenation patents; H. W. Fisher, head of Jersey's oil chemical department who testified about development of Paraflow and Paratone from I.G. data; E. V. Murphree, manager of Jersey's research and development department; and Willard C. Asbury, who discussed the early developments of synthetic rubber. Incidentally, all four came from Massachusetts Institute of Technology.

Frank A. Howard, president of Standard Oil Development Co., also was called upon to answer many of the patent interpretation questions.

Gives Background

Gist of Jersey's story of the "imaginary cartel", as developed by these witnesses over the 3-day hearing was:

Negotiations with I.G. were started in the middle 1920s when there were fears of an oil shortage in this country. High officials reported only 6 years' supply available and recommended developing liquid fuels from coal.

Jersey brought Mr. Haslam over from M.I.T. to start a laboratory for research on oil-from-coal. He went over to Germany to see what the famous chemical organization, I.G.F., had in the way of processes. He found the Germans far ahead of the U. S. in hydrogenation. But, as he pointed out, the Germans had been dependent on synthetics for many years. Mr. Haslam was much impressed by Germans' progress.

Work 20 Years or Buy

Choice, as Mr. Haslam put it, was to spend 20 years catching up with the Germans or else buy their knowledge and go on from there. But a straight-out purchase would mean going back every year or so to buy new developments.

"We were not buying some patents that could be packed up in a brief case and taken home," Mr. Haslam explained. "We were buying the 'know how' inside a man's head. We had to make them 'cough up' the information—to keep it flowing to us, not only what they knew then but what they would get each day."

So, the Germans were in a good position for trading, for driving a good bargain. And Mr. Haslam says (though Mr. Farish disagrees) that, except for the wartime need for synthetic toluol and other war products developed from I.G. processes, the Germans would have had best of the deal.

First Agreement in 1927

In 1927, Jersey took a half interest in the I.G. oil hydrogenation process for the U. S. only and gave I.G. half interest in proceeds for some Jersey oil refining processes. In this way, there was an incentive for each to develop processes of the other.

However, dissatisfaction developed, resulting finally in the several "agreements" of Nov. 9, 1929.

Main agreement of 1929 was a "simple purchase". Jersey bought, for the world outside of Germany, 80% interest in all of I.G.'s oil and coal hydrogenation processes, as well as other I.G. inventions on oil refining. This cost Jersey some $30,000,000.

But the Germans wanted more than just the cash. They wanted assurance that Jersey wouldn't use its newly-acquired knowledge of catalytic chemistry and invade the general chemical field.

This resulted in the so-called "division of fields" agreement by which "each party confirmed the understanding of the other that it did not intend to depart from its existing policies to enter the industrial field of the other."

Jersey agreed to sell to I.G. control of any new chemical development outside of Jersey's then existing business. In turn, I.G. was to sell control to Jersey of any new chemical development closely related to oil business. I.G. also offered a minority interest in any new chemical development related to oil but not so closely that a non-oil company could not exploit it. No corresponding obligation on this existed on Jersey's side.

Jersey explained the so-called "coordination agreement" as simply a letter signed by which the parties carried forward an understanding first stated about the 1927 patent agreement, namely, that the parties would settle any future questions "in spirit of our agree-

Justice Department and Chairman Bone Confer During Hearing

From the "prompter's row" behind committee table, Justice Department attorneys frequently jumped up to whisper suggestions during questioning of New Jersey Standard witnesses at Senate patents committee hearing. Here is R. M. Hunter (middle), Justice Department attorney, just after he had told something to Chairman Bone (left). At right is Creekmore Fath, committee counsel

W. S. Farish, New Jersey Standard president, was before Senate patents committee for 3 days

ment" rather than resorting to strict legal rights which might change over the years.

Fourth agreement of 1929 was described as a sales agreement covering synthetic gasoline sold by Jersey in Germany.

Senator Makes a Speech

Sen. Bone frequently interposed to make "speeches" about human rights not getting proper attention in wartime, that corporations were too much interested in the "almighty dollar".

The Jersey witnesses, for the most part, endured these in silence, although they obviously questioned the relevancy.

Mr. Howard shut off one effort to personalize the issue.

Sen. Bone said, "Now suppose your boy is drafted for Army service—"

Smiling, the Jersey man interrupted: "But he's already serving in the Air Corps, a volunteer."

Tells of Palembang

More talk about corporations not making sacrifices in the war effort finally prompted Mr. Farish to tell how Jersey's men had completely destroyed the company's Palembang refinery and other properties in Dutch East Indies. This $50,000,000 demolition was done while parachute troops drifted down from Japanese planes.

He also related how Jersey had given the R.A.F. detailed plans of its French plants so that aerial bombs could complete the destruction started by the company when France fell.

Typical of Jersey's aggressiveness was Mr. Haslam's reaction when committee Counsel Fath implied that some Jersey patents didn't give sufficient information.

"Can you give me the numbers of those patents," he demanded, whipping out a pencil and notebook.

Mr. Fath said he would have to go through the record and pick out the Jersey patents.

Nearly Come to Blows

But the climax came near the end. Spectators were filtering toward the exits, like in the ninth inning. Mr. Farish had just closed a stirring plea for wartime unity.

Mr. Hunter, Justice Department, took the stand to protest Mr. Farish's statement that "fake experts and notoriety seekers" had added to difficulties of the synthetic rubber problem. Mr. Hunter said that juxtaposition of this, with mention of his name in an advance press release, would lead to conclusion that Mr. Farish meant Mr. Hunter was "one of the fake experts", he said. (Mr. Farish did make such a statement in his testimony later, but, on questioning by the committee, said he was not referring to Justice Department men.)

Obviously aroused, Mr. Hunter then went on to comment that he "wouldn't believe any of the Jersey witnesses—except Mr. Murphree—under oath or otherwise." He topped that with the accusation of "deliberate misstatements".

Mr. Haslam sprang from his chair, advancing toward the committee table where Mr. Hunter sat. Other Jersey witnesses glared their astonishment.

"It that going to stand in the record?" Mr. Haslam demanded.

"Not if I can help it," replied Sen. Clark, of Idaho. "That man is going to prove his charge—or withdraw it."

"If he doesn't withdraw it, I know one way of settling it," said Mr. Haslam heatedly.

Withdraws Statement

Chairman Bone said he thought that, on reflection, Mr. Hunter would want to withdraw his statement. Sen. Clark pleaded with him to do so. And Mr. Hunter agreed to withdraw the word "deliberate". However, the chairman ordered the whole colloquy expunged from the record.

Then, the hearings were closed. But the Haslam-Hunter affair was not.

Mr. Haslam went up to the justice department man. Argument was renewed. Mr. Hunter said something about the Jersey company "insulting" him.

'Let's Settle Outside'

"Forget the Jersey company—this is between you and me," Mr. Haslam retorted. Drawing back his sleeve experimentally, the Jersey man added:

"Let's go outside and settle this personally."

"How old are you Mr. Hunter? Forty-seven? Well, I'm 54, so that should make up for our difference in size," he added. In calmer tones, he then asked Mr. Hunter to point out any "misstatements" in his testimony.

"Oh you can't," Mr. Haslam was heard to say. "Well, let's go right up now to Sen. Bone and you tell him that."

Mr. Haslam then jumped across the table and he and Mr. Hunter went up to Sen. Bone.

Hold 'Peace Conference'

The amenities were nearly restored before they left the room. Mr. Hunter suggested that several of the Jersey men go down to the justice department with him and go over the record. "And if I'm wrong, I'll apologize," he added. Mr. Murphree and Mr. Howard went down with him.

What came of that "peace conference" was not disclosed.

State Department Evidence Settles Lati-Condor Charge

Surprise of the 3-day hearing was Mr. Farish's producing documentary evidence that the U. S. State Department agreed with his version of the Lati-Condor matter —that Jersey had the U. S. ambassador's specific approval for each delivery to these Axis-controlled airlines in Brazil from April, 1941, down to within a few weeks of Pearl Harbor.

At first day's hearing, Sen. Bone raised the issue of supplying Lati and Condor with aviation gasoline "because", he said, "of the possibility of shortages (in the oil fields), since we are now being rationed on gasoline". He cited Thurman Arnold's testimony on this before the Truman committee last spring.

Mr. Farish then read a statement which quoted more from Mr. Arnold's testimony, including the allegation that Assistant Secretary of State Berle "had to threaten to blacklist" the Standard's Brazilian subsidiary before it stopped deliveries to the Axis airlines.

He cited Mr. Berle's testimony that Jersey "wished to be in the position of not breaking the contract (with the Axis-controlled airlines) themselves, but of being forced to break it by the United States".

Once Jersey had gotten the "black list" ultimatum from Mr. Berle, it dropped its request for the government to indemnify against any lawsuit by the Axis airlines for failure to deliver according to contract, Mr. Farish explained. But before and after this, the company had obtained specific approval for each delivery made.

Holds His Fire

Mr. Farish also explained negotiations leading up to this arrangement with the State Department about Lati and Condor. But testifying the first day, Aug. 19, he did not produce the documentary evidence.

However, the committee counsel, Mr. Fath, apparently was still not satisfied with Jersey's explanation. Next day, Aug. 20, Mr. Fath digressed from his questioning about the I. G. Farben deal to return to the Lati-Condor matter.

He asked Mr. Farish if he still

contended that Jersey had followed the Administration's policies in supplying these Axis-controlled lines in South America during summer and fall of 1941. Mr. Farish again insisted that this matter was handled under instructions of the U. S. ambassador to Brazil.

Produces State Document

Then Mr. Farish finally uncovered his "ace in the hole" which had been buried for months. During that time the Jersey company had been assailed in Congress and the newspapers for "dealing with the Axis when we were on verge of war".

In deliberate tones, Mr. Farish said:

"I want to offer for the record, Senator, a statement of background information supplied by the State Department to newspaper correspondents in Washington immediately prior to Mr. Berle's testimony before the Truman Committee, April 3, 1942."

Says Farish is Correct

The document cited the Farish testimony before the Truman Committee about the State Department approving deliveries by Jersey to the Axis-controlled airlines in 1941. Then, the State Department document, read by Mr. Farish, added:

"Mr. Farish's statement in this regard is correct."

Reading of this document produced something akin to consternation among Sen. Bone, Mr. Fath and their Justice Department advisers. The correspondent for the newspaper *PM* dashed up from the press table to join the huddle. Out of it came the question:

"How did you become possessed of that?"

Obtained from State

"One of our people got it from the State Department," Mr. Farish replied.

Earlier, Mr. Farish had explained that Jersey was not authorized to release the State Department document. However, it is understood that Jersey officials had told the State Department that, if pressed too hard, they would make it public. Apparently, Mr. Farish felt he had been driven to that point, saying:

"I am having to release it because I am continually attacked about the truthfulness of the statement (that the State Department had specifically approved the Brazilian deliveries)."

While the State Department's "background statement" concerned Mr. Farish's testimony before the Truman Committee at that time (last spring), the Jersey company president gave the same explanation of the Lati-Condor matter some 5 months later to Sen. Bone's committee—on Aug. 20.

The State Department document, as read into the record by Mr. Farish, follows:

"In connection with the testimony of Mr. Farish, president of the Standard Oil Co. of New Jersey, that the American ambassador to Brazil and several State Department officials had approved the sale of aviation gasoline to an Italian airline in 1941, the following statement is issued for background. Mr. Farish's testimony in this regard is correct.

"During the year 1941 the Department of State intensified its campaign to eliminate Axis control of airlines in South America. Among these were the so-called 'Lati' line, a trans-Atlantic airline running from Italy to Brazil; and the Condor line, a German-controlled line furnishing a large part of the air communications in Brazil.

"Brazil could not be expected to have her internal and external air communications paralyzed; therefore, to provide substitute services, the Department evolved a double-headed program.

"They arranged for the organization of a substitute trans-Atlantic service for Lati, and for American planes to fly internal Brazilian routes, as a substitute for Condor, pending the removal of Axis influences from that company.

"They also requested the Standard Oil Co. of New Jersey to make no supplies available to either of these companies except after consultation with the Department. They requested that these supplies only be delivered from Standard's stocks, instead of being consigned direct to consumers. These supplies were to be so handled as to assure that the Axis lines would use up certain reserve stocks which they had already accumulated, and would at no time be permitted to accumulate stocks of gasoline which would last them for more than a short time.

"The handling of these deliveries was under the general supervision of the Department and of the American ambassador in Rio.

"The result of this policy was that almost immediately after Pearl Harbor both Lati and Condor were forced to suspend operations, and their personnel and organizations were disbanded or placed under Brazilian control. American planes were immediately available so that the internal services formerly given by the Axis lines were rendered by American planes, operating under Brazilian control with the co-operation of the United States. Early in January an American service to Lisbon via Brazil and the South Atlantic was inaugurated as a substitute for Lati."

Chairman Bone (left) and Committee Counsel Fath confer. Seated just behind them are three Justice Department attorneys who frequently passed up pencilled notes or whispered advice on questions. Left to right, they are R. M. Hunter, Irving Lipkowitz and Patrick Gibson

Jersey Press Release Gives Summary of Farish Testimony

Mr. Farish's prepared statement, which formed basis for the 3-day presentation before Senate Patents Committee, was summarized by New Jersey Standard's public relations representative and distributed to newspapermen. Full text of this "official summary" of Mr. Farish's views is printed herewith. Cross-examination of Mr. Farish and other testimony, sidelights and developments at the hearing are covered in NPN's own news stories and pictures in this issue—Ed.

Charging that statements of witnesses before the Senate Patents Committee were based upon misinterpretation of contracts, bolstered up by selected material from his company's files, William S. Farish, President of the Standard Oil Company (N. J.) termed the case which these witnesses tried to build against his company "a jerry-built house".

Testifying at length before this committee, of which Senator Homer T. Bone is Chairman, Mr. Farish reviewed in detail the agreements made by Standard with I. G. Farbenindustrie of Germany during the fourteen-year period before the war.

"It is my own conclusion from a full knowledge of actual operations under these agreements that the United States got far more from Germany than Germany ever received from us", Mr. Farish pointed out. "If we could have known that the Japs would strike Pearl Harbor on December 7, 1941, we would have been even more anxious than we were to sign those contracts to permit us to weave into the technical knowledge and experience of the industries of our country a large part of the technical advances of modern German science."

From catalytic chemistry, resulting from these agreements, has come a long list of the industrial miracles of our present war production, he said. The cooperative research between Standard and I. G. gave this country the first processes for producing 100-octane aviation

gasoline and synthetic toluol, among other vital war products.

"Half of the bombs we are dropping on Japs and Nazis are made possible by the research based on that contract with I. G.", Mr. Farish said, adding that our bombers today would not only not have bombs to drop were it not for synthetic toluol, but would lack the range to get to and from their bombing objectives were it not for products that came from what Standard learned from I. G.

He said that every synthetic rubber plant now being constructed by the government is being built in large part with plans engineered by Standard. The I. G. contracts, he emphasized, "started us on the road which led to work on synthetic rubber."

Mr. Farish explained in substantial detail the history of his company's relations with I. G., pointing out that his company was dealing back in 1927, 1928, and 1929 with the "new Democratic Germany which was struggling toward a respected place among the family of nations".

Standard's first contract with I. G. was made in 1927 when it took over a half interest in the oil hydrogenation process in the United States only and Standard and I. G. agreed they would cooperate technically to improve oil refining processes. Later this agreement was supplemented by an exchange of letters between the heads of the two companies, which, he said, was "a declaration of good faith, good intention and a desire to settle questions in the spirit of the agreement."

"Fifteen years later", Mr. Farish said, "the Anti-Trust Division labeled this letter a 'coordination agreement' supposed to link together the several contracts of 1929 into an imaginary 'world cartel' for the oil and chemical industries."

Stating that the word "cartel" means to him "a combination of competitors to control production and fix prices", Mr. Farish said that he had read Thurman Arnold's explanation of what he means by a cartel and quoted Arnold as saying that "it inevitably pursues a policy of high cost and low turnover because short-run profits are always more attractive to a cartel than a struggle for competitive efficiency which comes of full production".

"Our relations with I. G. have never constituted a cartel under either of these definitions", Mr. Farish declared.

He said that his company's main 1929 agreement with I. G. was a "simple purchase" under which Standard bought for the world outside Germany full control of, and an 80% financial interest in, all of I. G.'s oil and coal hydrogenation processes as well as their other inventions in oil refining.

"This straightforward purchase, widely hailed at the time in American newspapers, is the thing that is falsely labeled a world cartel for oil. How anyone could apply the term cartel to this 1929 purchase of German inventions is beyond our understanding", he said.

Standard started even before it signed this contract to arrange to sell oil and coal hydrogenation processes to the American oil industry at large through an industry company in which it had only a minority stock interest and a right to future royalties.

"We passed into the hands of the oil industry the control of and responsibility for new hydrogenation techniques which, but for our purchase, would certainly have been used by the Germans for their sole benefit", Mr. Farish said.

This main agreement was supplemented by two other agreements, he said. One of these permitted Standard to sell in Germany gasoline made there from coal. The other agreement bound Standard and I. G. not to enter the industrial field of the other.

I. G. was selling to Standard all of its oil refining patents and would have been handicapped if it tried to enter the oil business outside of Germany. As a result, it asked Standard to stipulate that it did not intend to depart from its own business and take advantage of the education it was getting in catalytic chemistry from I. G. to set itself up in the general chemical business. Standard further agreed to sell to I. G. control of any new chemical development not closely related to Standard's then existing business nor made from Standard's raw material—oil and natural gas. I. G. agreed, on the other hand, to sell to Standard control of any new chemical developments so closely related to the oil business that it could only be carried on effectively as part of the oil business.

"This agreement is the Anti-Trust Division's imaginary chemical cartel", Mr. Farish declared. "It is the foundation of the claim that we violated the Anti-Trust laws of the United States. We were absolutely sure that the agreement would advance the interests of our nation, the American oil industry and our company, and we were advised by most competent counsel that it constituted no violation of the anti-trust laws."

Mr. Farish told the committee that Assistant Attorney General Patrick Gibson was "entirely wrong" when he said that Standard would not have had control of Butyl rubber, under the terms of a 1930 agreement with I. G.

"Butyl rubber", he said, "has not been and cannot be made on a large scale except as part of an oil business. Furthermore, I. G. never even acquired a minority interest in Butyl rubber in the United States, where its principal value will certainly always lie."

He said that the net result of the so-called "chemical cartel" was that Standard acquired a minority interest in a group of oil-chemical processes which I. G. had developed and owned and would have continued to own exclusively except for this arrangement. Standard gave I. G. an agreement to sell control of chemical inventions entirely outside the oil industry. However, he pointed out, Standard never before or since has made any such inventions of any consequence.

Mr. Farish charged that Special Attorney Irving Lipkowitz of the Anti-Trust Division painted a distorted picture of Standard's operations in acetic acid, acetylene and acetaldehyde. His company and I. G. spent $1,500,000 on experiments designed to produce cheap acetylene, a missing link in the synthetic rubber chain. He said that, whereas Lipkowitz had charged Standard with preventing the full development and use of this process, the truth was that their agreement put an otherwise idle patent to work and started something, not stopped it.

"If I. G. had wanted to prevent the development and utilization of this process all it had to do was not to sign such a contract with us", Mr. Farish explained, adding that actually the process was found after costly experimentation to be worthless as far as producing acetylene or acetic acid on a commercially attractive basis was concerned.

Mr. Farish said that Standard's manufacture of Paraflow was possible only because I. G. chemists had discovered a chemical curiosity and "handed us a sample to play with." With this sample Standard's chemists were able to end a search of years and get a product which they could put into oils to keep them from freezing in cold weather.

"We never had a monopoly on Paraflow except the seventeen-year monopoly the patents gave us, and that is what government patents are for", he said.

He further refuted the previous testimony of John R. Jacobs, a Special Attorney in the Anti-Trust Division, who charged that Standard restrained the use of the Methane Steam Process and thus prevented our strategic explosive industry from obtaining necessary licenses under the patents to increase war production.

The Methane Steam Process, Mr. Farish explained, was used by his company to make hydrogen for oil hydrogenation. This same process is used also to make synthetic ammonia, but Standard had never owned the rights for such manufacture. When, however, the National Defense Program indicated the need for synthetic ammonia plants, Standard advised the Government of this situation. As a result, six

Haslam Demonstrates Hydrogenation

A lump of coal and a bottle of hydrogen are used by R. T. Haslam to illustrate hydrogenation

large ammonia plants, built under Government sponsorship and making about half the emergency ammonia to be produced in connection with the war effort, are using this process.

The effect of Standard's contract with I. G., Mr. Farish said, was to give this country in advance of the war, all the knowledge and plant designs necessary to go ahead with the best process for synthetic ammonia whenever the need arose, so that by a simple act of a war agency all of the patent complications assumed by the witness to have been sufficient to hamstring the United States Government, were swept away.

On synthetic rubber, Mr. Farish said that when the 230 documents interpreted to the Senate Patents Committee by Robert M. Hunter, Special Assistant to the Attorney General, were considered on their merits, and apart from Hunter's interpretation, "they show a record of which we are proud."

Mr. Farish characterized the synthetic rubber problem as one of the most complicated chemical and industrial problems this country has ever had to face and said that its "difficulties have been enormously aggravated by the widely publicized statements of a number of fake experts and notoriety seekers who didn't know what they were talking about."

Mr. Farish outlined the early development of Buna rubber and said that the principal bottleneck to its commercial production in this country was butadiene. During 1939, he said, five leading rubber companies in this country were running tests on Buna rubber tires, using products which I. G. had supplied at Standard's request with the actual manufacture of tires carried out with the help of an expert sent from I. G. for this purpose. The only thing wrong with this picture, he pointed out, was that the process still belonged at that time to Germany, with Standard owning only a minority interest.

"Our solution of this situation was to eliminate I. G.'s interest in the Buna process in the United States completely", Mr. Farish explained. Before the end of September, 1939, an agreement had been worked out under which we were to take over all of the rights in the Buna rubber process for the United States and the British and French Empires and give up all our rights for the rest of the world. Within one month after Europe went to war, and more than two years before America went to war, we had eliminated all foreign interest in this process and were free to do with it whatever seemed necessary. If we had been gifted with foresight, if we had known that we would be at war with Germany in 1942, we could have taken no wiser step."

Once this had been done, Mr. Farish said that Standard reported the situation to the Army and Navy Munitions Board in November, 1939, and asked for its advice, kept constantly in contact with appropriate Government agencies and followed their advice, began its own plans to produce Buna rubber in the United States, and offered to license all the rubber companies it thought would be interested in producing Buna rubber. Standard submitted samples of various synthetic rubbers on forty-six occasions in the two and a half years before Pearl Harbor to seven different Government agencies or their appointed representatives.

Mr. Farish said that it was not until the middle of 1941 that the Government itself did anything definite about Buna rubber production, and that not until Pearl Harbor did it act promptly to expand its rubber program.

"To expedite this, it wanted to get a complete pool of all patents and all information on Buna rubber", he said. "We threw in all our improvement patents without royalty. A royalty of 1% was allowed us for the basic patents for the period of the emergency. There was no question of preference of any kind to our company in the actual manufacture of the rubber or in any of the raw materials for it.

"While we ourselves are making only a small percentage of butadiene for the Government program and absolutely none of the Buna rubber itself, plant designs and detailed processes for Buna rubber and for butadiene manufacture based on our engineering are being used widely throughout the rubber and oil industries under the information and patent pools which the Government initiated with the approval of the Attorney General."

Mr. Farish said that "like all other American business men, our primary concern right now is meeting the demand of war agencies for the production of miracles, demand for more and more production of better and better war weapons out of less and less plant equipment."

He said that to save time, material and lost motion in producing war materials the Government is urging complete technical cooperation on the part of industry, as a result of which his company is in a pool on Buna rubber with the leading rubber companies. In butadiene, he said, it is in a pool of four chemical and four oil companies; in styrene manufacture in a pool of four chemical and two oil companies; in alkylation processes for 100-octane gasoline in a pool of six companies; in catalytic cracking and in toluene production pools are just now being set up in more effective form.

Gowanda Is Rationed

Gowanda, which lies athwart the boundaries of Cattaraugus and Erie Counties in New York, is within the area of western New York where gasoline rationing took effect on Aug. 22, OPA ruled in Amendment 8 to rationing regulations.

Issuing the ruling on Aug. 22, OPA said Erie County is in the area while Cattaraugus is not.

More Ration Books Stolen; Now Equal 1 Tanker of 'Gas'

WASHINGTON — OPA ration books continue to disappear by the thousands with the latest thefts reported in Connecticut.

Eight thousand books were reported stolen from a rationing board office in Hartford and another 1400 taken in Bridgeport—and OPA doesn't know the serial numbers of the books stolen in these cities, spokesman for the office said.

Previously, 4450 books were reported stolen from two local rationing boards in Washington, D. C. However, OPA did have the numbers of those books (*see NPN Aug. 19, p. 7 for complete list*). Reports are that coupons from some of the missing Washington books have shown up in Baltimore.

No Record of Numbers

When asked by NPN for the serial numbers of the books reported stolen in the two Connecticut cities, the OPA spokesman here said:

"There is no record of the serial numbers—evidently clerks at the boards in these two cities kept no records of the serial numbers."

Local boards, he said, had been warned to keep strict records of the serial numbers of all books, and to keep only a few on hand, with the rest securely locked up.

No Way to Check

The OPA spokesman upon questioning said:

"I guess there isn't any way to check up if someone passes one of these books at a service station."

Prosecution of anyone caught with a stolen ration book, it was pointed out, could take one of three courses: prosecution under section 35 of the criminal code, calling for one to 10 years imprisonment, $1 to $10,000 fine, or both, for theft of government property; prosecution under section 48 of the criminal code, calling for 5 years imprisonment, $5000 fine, or both; and prosecution under the second war powers bill, calling for one year's imprisonment, a $10,000 fine, or both, for illegal possession or disposal.

Books Worth 2,659,200 Gal.

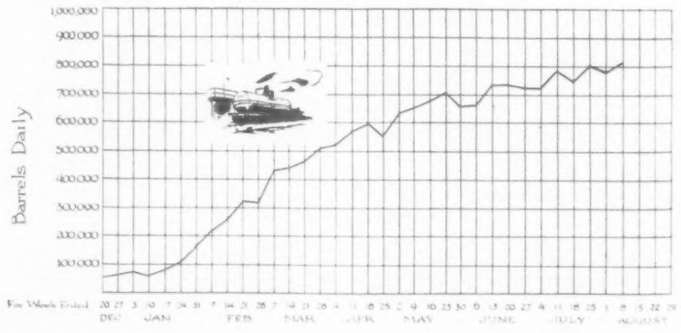
Figuring a total of 13,850 "A" books lifted in these three reported thefts—Washington, Bridgeport and Hartford—would result in a total of 2,659,200 gal. (63,304 bbls.)—or carrying capacity of one average tanker or 332 tank cars or 5 trainloads.

Rail Hauls to East Reach 830,820 B/D

WASHINGTON—Tank car shipments of crude and products reached a new top daily average of 830,820 b/d for the week ended Aug. 15—an increase of 21,390 b/d over the preceding week.

Individual loadings by participating companies during the week ended Aug. 15 were as follows:

Allied, 62; American Bitumuls, 130; Amsco, 198; Arkansas Fuel Oil, 215; Ashland, 116; Asiatic Petroleum, 95; Atlantic Refining, 2711; Chalmette, 87; Cities Service, 1579; Conoco, 333; Crown Central, 31; Daugherty Refinery, 38; Gulf, 1940; Hartol, 417; Pan American, 2141; Petrol Corp., 291; Petroleum Heat & Power, 152; Pure, 430; Roosevelt, 6; Shell, 849; Sinclair, 2547; Socony - Vacuum, 2875; Kentucky Standard, 363; New Jersey Standard, 5347; Sohio, 202; Sun, 1856; Talco, 52; Texaco, 2010; and Tide Water Associated, 621—a total of 27,694 loaded tank cars.



Graph shows trend of rail hauls to East in barrels daily

The EDITOR'S Page

Readers comments and opinions will be much appreciated by—WARREN C. PLATT, NPN's Editor and publisher, Penton Building, Cleveland, O.

Join the U.S. TRUCK CONSERVATION CORPS

That We May WIN This War, Congress Should Investigate Oil's Untruthful Investigators

AGAIN, we ask, just what in Heaven's name do "the powers that be" at Washington want of this oil industry?

In fact, just what do they want of all American industry? For what "Washington" has been saying of and doing to oil, it has been saying of and doing to other large American industries that are equally vital to our war success.

Through its many and conflicting war agencies, "Washington" has been hampering oil's efforts to get sufficient petroleum products to the East Coast by falsely pronouncing a reasonable price to pay for the extra transportation cost as a step toward "inflation"; and against a similarly unfair price ceiling over the country, the most "social reforming" of these agencies is also promising to "rub out" the marketing companies that are not "socially desirable"—now estimated by the "planners" to total 80% of those marketers now in business—; and through other of its agencies it has materially interfered with the efforts of the oil industry to get into the manufacture of synthetic rubber; and through its Treasury Department, "Washington" would block the discovery of much needed new oil fields, especially by the small Independent operator, through eliminating the depletion allowance in tax legislation.

Then "Washington" has carried on, with its Department of Justice operating through various Senate and House investigating committees, a continuing and increasing political and legislative attack on the larger oil companies, as well as on the larger companies in other industries. The Justice Department has supplied many of the leading witnesses that have made the strongest kind of charges against big American companies and particularly oil companies,—and the Department has had its attorneys coach the Senators and Congressmen in their examination of industry witnesses as those witnesses sought to present industry's side to these attacks.

Industry, especially oil companies, have supplied voluminous records from their files, to which government already had full access. Industry witnesses have met all the charges head-on with flat denials of some statements of alleged fact and with interpretations of other facts that were the opposite of the attackers' personal ideas. And at the end of these inquisitions the Department of Justice, we have reason to believe, has written those parts of some committee reports in which it was particularly interested and this writing has not by any means been always fair or truthful.

Victory Depends On All Business

AND all the time these companies and industries that have thus been attacked, and their officers who came to Washington to defend their honor, are the ones this country is most dependent upon to win this war. Yet while these industrial inquisitions have been going on, even "Washington" admits that we are doing a good job of "losing this war."

One cannot help but ask, what is it "the powers that be" want of industry and particularly of oil?

Under the guise of carrying on the war, do these "powers" want to eliminate Independent competition in oil while they take over the operation of the large companies and thus take control of this big industry?

Are the powers-that-be at Washington more concerned with economic and social reform than with winning the war? Or do they still think they can carry on and win both reform and the war?

If all these attacks and regulations and interferences with war operations, were aimed at and hit ONLY the major oil companies, and if these attacking agencies were developing some real evidence of corporate misconduct on the part of these larger companies—which they decidedly are not—one might reconcile the attacks with a determination to see that the necessity of developing tremendous manufacturing units in order to make the immense quantities of this war's munitions was not going to destroy small business. But offsetting this theory anyway is the fact, evidenced in many ways, that high economic "thinkers" of "Washington" not only have been planning the elimination of small business but some do not believe in small business units anyway.

"D. of J." Probes Through Senators

THESE attacks against oil companies reached a high spot last week when attorneys from the Department of Justice directed in detail a week-long "hearing" by the Senate patents committee that received the reply of President Farish and the Standard of New Jersey to charges made by the Department regarding the Standard's alleged German cartel.

President Farish made the company's reply assisted by associates. He took the brunt of the attacking questions of the attorneys for the Department of Justice made through some members of the patents committee, and through the committee chairman. At the end of the last session one Justice Department attorney volunteered to the committee that he would not believe any Standard Oil witness, except one of the scientists.

This remark is on a par with so many of the statements not only made by witnesses before these Congressional committees but made by some of the members of these committees. The rule is supposed to be that the committee members, through their secretaries or counsel, have convinced themselves that a witness is reliable, knows whereof he is speaking, and probably has a good and true story and one which will help the committee, before he is allowed the privilege of telling it for the record.

Of late years particularly, if this sizing

up of prospective witnesses is followed at all, it is but to give generous benefit of doubt to all comers seeking appearances before committees. Witnesses and some committee members have used these hearings to get publicity for the wildest sort of statements, and without rebuke from the committees.

This Committee on Patents of the Senate seemed to be more generous in permitting wild statements than other committees. It permitted an East Texas refiner to make all sorts of charges before it the week before until one Senator on the committee rebelled and flatly said he would believe a major oil company patent counsel and not the refiner witness. This same witness had tried to tell his story before other committees of Congress but had been turned down because counsel and members of these other committees could not bring themselves to give any credence to his tale.

Elsewhere this week and in previous weeks NPN prints a great many of the facts of these hearings and facts from the replies of President Farish and his associates.

But it is hard to do justice to this fight between "Washington" and the Standard of New Jersey and other large oil and other companies because of the vast amount of ground covered by the allegations and hence that has to be covered by the defendants, for such they in truth are.

To judge fully, as some readers may care to, of a long and complicated and important controversy such as this, one should read all of the stenographic record and all the exhibits, which will be in print shortly, as a part of the committee's report. For this printed transcript address your own senators or The Committee on Patents, U. S. Senate, Washington, D. C.

Should Overhaul The Investigators

IN JUSTICE to itself, American industry should demand a public investigation of all these investigations and other attacks upon it. It should be possible to find a Congressional committee, either House or Senate, that would have the brains, fairness and courage to carry on such an investigation. There are members of both houses who could do a good job of it and who would not be coerced by any political maneuvers of the administration.

Such an investigation could study the investigations made in recent years and count and report the number of false charges that were not supported by evidence. It could report the unfair methods pursued, and note the times when witnesses were not given opportunity for fair reply. It could total the time and money spent on these investigations by House and Senate and particularly by business and balance that cost with what, if anything, came of them.

These investigators should have power to delve through the private files of the Department of Justice, to read the stenographic reports of all conferences pertaining to the investigations under investigation, to summon all employes of that department and put them under oath and ascertain all the circumstances and conversations surrounding the origin of these "investigations".

These investigators should also be instructed to ignore that dubious thing called "Senatorial" or "Congressional Courtesy" and to dig hard into the files of all these investigating committees, to question committees' employes and even the committees' members to find out, if possible, just what kind of a job these committees were trying to do and how they went about it and why.

Congress Should Get the Truth

CONGRESS—both houses—not only has a duty to the citizens of America to see that all government departments and war agencies do fair and honest and efficient jobs, but Congress also has a duty to these same citizens to see that its own creatures and servants and members also do fair and honest and efficient jobs.

Perhaps it is a vain hope to expect that those who have harassed and unjustly attacked and have lied about business in government departments and in Congress will be brought to the bar of public opinion. But then maybe the need for getting still better management of our war effort in order that we may fight a winning war instead of a seeming "losing war", may prompt a fumbling Congress to buck up some courage and really find out why we may seem to be "losing this war" at present?

Such an impartial and courageous investigation, we know, will show up the vicious and appalling untruthfulness of some in government who have been attacking the oil industry of late. And it will reveal still more, we are sure, what a good job the Standard Oil Co. of New Jersey and all its 50,000 employes and several hundred thousand stockholders, and all other American business, have done for their country; yes, a job that shines in contrast to that which has and is being done by some others, especially in Congress and in official "Washington".

Knock Down the Truck Barriers And Speed Up the Switching Crew

WE ARE short on transportation facilities and getting shorter; there is a war to be won and it is getting bigger; but the old time barriers against motor trucks are still up at state lines on our country's highways.

Result, this country is not getting the full use it can or should from its trucks. Oil companies as truck owners are paying a penalty for these barriers with their own tank transports and oil companies as gasoline sellers are paying an additional penalty because full use of trucks would mean more gallonage for them.

A manufacturer of transportation equipment is carrying on a vigorous advertising campaign against these barriers. He paid for a two page editorial of his own in NPN last week. That advertisement sold the hardship these barriers inflict on this country and it sold the great necessity of this country's getting the absolute maximum out of its transportation. The advertisement filled two pages with facts and good sales talk about these 8 barriers and then stopped—save to sign the name of the transportation advocate who paid for the space and that name was Fruehauf Trailer Co., Detroit.

Fruehauf is running similar advertising, written to fit each particular field, in other business papers, in national papers. In the weekly paper of the newspaper publishing and editorial world, *Editor & Publisher*, it is running a campaign to educate the newswriters of the country to the needs for dropping these truck barriers and speeding the trucks on their way.

Other advertisers these days are also speeding transportation with their copy in NPN and some are teaching conservation of their present outstanding equipment.

Two NPN advertisers have been telling of the need for speeding tank cars whose value today, one might well say, is more than their weight in gold, even including 10,000 gal. of gold, liquid or metal.

The tank car men, UTLX—Union Tank Car Co. and GATX—General American Tank Car Co., the railroads and the oil companies have exceeded all dreams as to what can be done in moving tank cars of petroleum to the East Coast. That movement is now more than 800,000 b/d and it is hoped to get it above 1,000,000 b/d. A year ago people were skeptical that the rails could move even 200,000 b/d and before that for years there not a barrel had got down east by rail.

Further, many a solid trainload of these cars are moving from the Gulf Coast straight through to the East Coast and up into New England before they are broken. And long trains of empties keep moving back west on the same high speed schedule.

But this is what the railroads, the tank car people and the refineries are doing. The men in major companies' and Independent oil companies' terminals and bulk plants can do still more by unloading their tank cars faster. They should be unloaded just as if there was a demurrage charge of $1000 an hour after only say 2 hours of free time. And they should be yanked in and out of the switch just as if the local switch engine crew and the local yardmaster would be docked a month's pay for every 15 minutes they delayed getting to

Two Powerful Destroyers
of INSECT PESTS
. . . in CROWN CONTAINERS

THE Shell Oil Company fights insect pests on many fronts . . . for Shell's special insecticides are used in homes, farm buildings, and for direct application to livestock of all types.

Both Shell Tox and Shell Livestock Spray are packaged in Crown Cans . . . in sizes running from a pint to a gallon for domestic use . . . in gallon containers and larger for farm use.

Protection against insect pests of all varieties has become doubly important in war time.

Crown Cans protect this protection—in shipping, in storage, and in use. Before the present shortage of materials, Crown was proud that its containers were selected for Shell's complete insecticide line.

CROWN CAN COMPANY, PHILADELPHIA, PA., *Division of Crown Cork and Seal Company.* Baltimore • New York • St. Louis • Houston • Madison • Orlando • Fort Wayne • Nebraska City.

CROWN CAN

your track after you, the consignee, phoned the car was unloaded.

Such penalties would get cars in and out of sidings so fast you could hardly see them, but such quick movement would add a good many thousands of tank cars a day to that East Coast movement which probably would insure enough fuel oil this winter to keep quite a few hundred thousand homes down there half way warm instead of cold as they likely will be.

So every oil marketer has two big jobs,—

1—to knock down the remaining state truck barriers and speed up his tank trucks and all trucks, and

2—to shunt those cars in and out of his switch so fast that they would never seem to stop.

Such expedited transportation service would—well just imagine you and a sick wife and a couple of kiddies are living in a down-east home that WAS oil heated in previous years but it isn't this year.

You have the answer. Just tell your own gang and the switching crew to step on it fast.

Governmental Nonsense

The 7nth Army Corps buys and uses freely asphalt with a positive oliensis spot test, which means it may be from cracked material and it may oxydize and lack some ductility, but that all depends.

The 8th Army Corps, right next door to the south, won't buy any such asphalt even though it is made from crude so that it will not oxydize and does not lack ductility.

So the 8th Army Corps is turning down bids for asphalt from right next door to a new b—r base out near a lot of refineries in We—rn K—s. It will take about 25 cars to haul 63 car loads of this asphalt from where it is expected to buy it, while the other stuff that is right next door can be trucked.

So the 8th Corps has decided to help (?) get fuel oil and gasoline to the citizens on the East Coast by using the 25 tank cars.

Basis of Group 3 As 'Ceiling' Price Narrowed by OPA

(*Continued from page* 3)

but sold at a discount off published quotations for Group 3.

Text of the interpretation follows:

"To all cities on the teletype circuit

Attention: All OPA Head Attorneys

July 29, 1942

Inquiries have been received as to the meaning of section 1340.159 (B) (1) in connection with certain price quotations appearing in the publications mentioned in that section. These published prices appear under the following heading:

"Oklahoma"

"Mid-Western (Group 3 basis)"

"F.O.B. Group 3 (Oklahoma)"

I. It is our opinion that prices published under these headings are not quoted prices within the meaning of section 1340.159 (B) (1) except when the **source** of the products is a refinery in Oklahoma and when the sales are **actually** made F.O.B. a refinery in Oklahoma. When petroleum products are shipped from a refinery out of the state of Oklahoma, these quotations do not realistically represent prices on an F.O.B. shipping point basis. Furthermore, these published prices are not to be considered as delivered price quotations to the various destination points in the Mid-Western area in view of the frequent variance both up and down in **delivered prices** from the **published prices** under these headings plus full freight from Oklahoma. Such quotations are used by industry merely as a pricing formula except when the products are actually shipped from an Oklahoma refinery. The peculiar nature of these quotations is recognized by NATIONAL PETROLEUM NEWS itself in an explanation entitled "How Prices Are Quoted".

II. Accordingly, it will be held that where a sale of a petroleum product is not actually made F.O.B. a refinery in Oklahoma, then assuming no other quoted price in the publications mentioned is specifically applicable, the maximum price must be determined under section 1340.159 (B) (2) even though the pricing formula used by the parties is "F.O.B. Group 3, basis," "F.O.B. Oklahoma basis," or F.O.B. Tulsa basis."

Contracts are frequently written in which these formulas are used in arriving at a price. The fundamental consideration involved in the use of these formulas is the establishment of laid-down cost to the buyer at a particular destination and not the maintenance of a uniform pattern of realizations at a particular shipping point. Prices arrived at under such contracts are ordinarily, therefore, to be considered as destination point or delivered prices, not F.O.B. shipping point prices for the purposes of section 1340.159 (B) (2).

Inquiries should be informed that in the future, sellers will be expected to abide by the schedule as above interpreted.

Harold Leventhal
Assistant General Counsel

Operators on West Coast Ask 7-to-7 Closing

NPN News Bureau

LOS ANGELES—Strenuous efforts are being made by station operators in District 5 to have the Petroleum Co-ordinator order 7-to-7 closing of service stations. This is directly the result of an Army order, effective Aug. 20, which will dim out the Pacific Coast as far inland as 150 miles.

Under these circumstances, service station operators argue, 7-to-7 closing will be an absolute necessity, since night driving will be practically stopped. Autos will be allowed to use light only slightly stronger than parking lights.

Letters from NPN's Readers

By Telegraph
Cedarhurst, N. Y.

Editor, NPN:

Your editorial of the 12th is so full of truth and common-sense it should be published in every daily in the U.S.A.

Sam Lane,
Cedarhurst, N. Y.

Editor, NPN:

You always write good Editorials, but the one in your August 12 issue, page 13, is a humdinger.

We are in 100% accord with the view expressed.

We think it is about time that the oil industry is not used as a football but let it take its rightful place and do the real job in our United War Effort which it is capable of doing, if not constantly stepped on and crushed to death by a dozen different bosses.

Certainly hope that the right party will read your recent editorial and that the truth of it will sink in and somebody will wise up before it is too late.

Very truly yours,
E. E. Oplinger,
Vice-President,
Lehigh Valley Oil Co.,
Allentown, Pa.

June 'Gas' Demand Dips 11%—Bureau

(*Continued from page* 3)

bbls. more than in May but 352,000 bbls. below a year ago. The yield of finished gasoline declined 2.1% to 37.8% compared with 39.9% for May. Yield for June, 1941 was 44.5%.

"Responding to improvements in transportation", crude production continued to increase in June, the daily average being 3,619,800 bbls., compared with 3,554,600 bbls. in May. In May, 1941, production was 3,834,200 bbls.

Production rates for most states increased, but Texas declined. Kansas registered the outstanding gain, a total of 271,400 bbls. compared with 244,500 bbls. in May. Illinois' production continued to decline, amounting to 284,000 bbls. compared with 291,700 bbls. in May.

Well completions were off from 1599 in June, 1941, to 726 in June of this year. "In total initial and the ration of dry holes, the comparison was ever worse," Bureau said "The initial in June was only 35% as large as in June, 1941, whereas the ratio of dry holes to total completions was 33% compared with 23% a year ago."

S. C. Tolbert Dies

S. C. Tolbert, a prominent figure in the oil business in Concordia, Kans., for the past 25 years and a member of the board of directors of the Kansas Oil Men's Assn., died at his home in Concordia, Aug. 10. Mr. Tolbert had also served as mayor of the city.

Canada Punishes 223 Stations For Rationing Violations

Special to NPN

OTTAWA—Canadian service stations are being taught that they must obey gasoline rationing regulations—"or else". Aug. 15, the Oil Controller banned 223 stations from selling gasoline until Aug. 27 for alleged infractions of rationing regulations. In most cases, the infractions were claimed to have been made by accepting detached rationing coupons or coupons issued for other cars.

The operators will be permitted to stay open and continue servicing cars, as well as to sell motor car supplies other than gasoline.

Kerosine Lights 2 Million Homes

NEW YORK — More than 2,000,000 dwelling units along the East Coast still use kerosine or gasoline for household lighting, American Petroleum Institute reports from census figures.

Three-fourths of these petroleum-lighted homes are in the six south Atlantic states of Virginia, West Virginia, North Carolina, South Carolina, Georgia and Florida. Pennsylvania figures are not yet available

Ickes, Henderson, Patterson To Study Fuel Oil Rationing

WASHINGTON — The attitude taken by WPB Chairman Nelson—who has more power than any other man in the country except President Roosevelt—indicates that he is not yet convinced of the need for rationing fuel oil on the East Coast this winter.

Mr. Nelson has, to a large extent, followed a "hands off" policy on fuel oil rationing, depending upon the advice of his subordinates who are able to stay in closer, day-to-day touch with the problem.

But the controversy over fuel oil rationing has reached such a pitch that he has been forced to name a committee to canvass the problem.

Announcing formation of the committee on Aug. 21, he said frankly that its first duty is to find out whether curtailment is necessary for easterners during the 1942-43 heating season.

To Decide Method

The next thing for the committee to decide, he said, is the best method of "rationing" in case curtailment is necessary.

To the committee, he named:

Co-ordinator Ickes, who has been prophesying cold homes next winter but, so far, has not advocated direct rationing.

Price Administrator Henderson, who has been forthright in supporting rationing. It is his OPA that has developed a "blue print" for rationing.

Undersecretary of War Robert P. Patterson, who has been out of the fuel oil picture completely.

The presence of Undersecretary Patterson on the committee would seem to indicate that he is to mediate between Messrs. Ickes and Henderson.

Mr. Nelson said that he would sit with the committee in some of its meetings.

See Quick Decision

Modus operandi of the committee was not made known. An official close to Mr. Nelson said that the next public announcement about the committee probably would be its decision.

Meanwhile, Deputy Co-ordinator Davies complained that there has been a "disturbing lack of public response to the fuel and heating oil situation along the Atlantic Coast."

He issued the statement on Aug. 24, simultaneously releasing a report from District 1 General Committee Chairman John A. Brown, that industrial oil-to-coal conversion is making "excellent progress" but domestic consumers are lagging

Mr. Brown said 50% of eastern plants that could convert have made the change, estimating that their action was saving more than 22,500,000 bbls. of fuel oil annually.

Not more than 1% of the homes now heated with oil have converted, he said.

Industrial Conversions

When the industrial plants finish converting, the annual saving in fuel oil should be 42,000,000 bbls. or about 35% of the total industrial fuel oil consumption on the East Coast.

"Our own information," Mr. Davies commented, "fully confirms the petroleum industry's estimate of the disturbing lack of public response to the fuel oil situation along the Atlantic Coast. Only a realization that the 'Atlantic Coast area' means 'my home town,' and that facts today do not justify any confidence that severely depleted fuel oil supplies can be built up to meet even minimum needs during the coming winter, will stimulate sufficient precaution on the part of fuel oil consumers to avert the threatened distress."

L-70 Violation Charges Bring Suspensions

WASHINGTON — Alleged violation of L-70 brought an order for a four-month suspension of gasoline deliveries to a Brockton, Mass., gasoline dealer when WPB ruled in Suspension Order S-83 that the dealer could not accept any motor fuel as defined in the order at any station owned, operated or leased by him between Aug. 20 and Dec. 20, 1942.

The dealer, according to WPB, had 2 stations. At the first station, he bought a large supply of gasoline. After the second station had received its monthly quota under L-70, WPB alleged, the dealer transferred gasoline from the first to the second station.

WPB construed this as a "wilful violation" of the order.

Meantime, OPA issued a 6-month suspension order against a Myrtle Beach, S. C., dealer for alleged violation of gasoline rationing regulations.

British Alter Lube Specs

WASHINGTON—To provide lube oils of uniform specifications for American, British and Russian use, certain British lube specs have been changed substantially, as follows:

British M. 120 H.D. is now SAE 10, formerly SAE 20. British M. 160 is still SAE 30 but now calls for heavy duty, so specification reads M. 120 H.D.

M. 400 which was SAE 60, and M. 220 special which was SAE 40 have been dropped—the compromise being M. 400 H.D. or SAE 50.

C. 600 may be changed to VVL 761, U. S. Army specification.

The all-purpose grease, known as grease G. S. is replaced by a specification conforming to U. S. Army lube specification 2108.

OPA Cuts Quotas On Tire Rationing For Next 4 Months

WASHINGTON—Tire rationing is becoming tougher.

Because over-time truck operations forced the use of an abnormal number of tires this summer, WPB intends to cut down on the amount of rubber available for each remaining month to keep within the year's allotment.

Facing this downward trend of rubber allocation, OPA backed up its recent strengthening of rationing regulations (which cut out candy, beverage, and other so-called luxury deliveries) by announcing that the number of tires available in September would be substantially less than in August.

War Workers Quota Hiked

The only exception to the cut was the quota of Grade II tires which are rationed to war workers.

September quotas set by OPA follow:

Trucks — new tires, 239,445 against 316,695 in August; recaps, 262,258 against 355,883; tubes, 262,261 against 347,696.

Passenger cars—new tires, 38,297 against 58,308 for List A; Grade II, 115,544 against 87,860; recaps, 486,468 against 637,959; tubes, 333,450 against 418,910.

Price Administrator Henderson said the reduction follows a general seasonal pattern, but amounts to a sharp cut in the light of heavy truck operations.

Elsewhere on the tire front, the National Highway Users Conference emphasized the necessary functions of private automobiles, calling for allocation of synthetic rubber for tires as a "great aid to the war effort"

Trans-Ohio Line Approved by OPC

WASHINGTON — A 100-mile trans-Ohio pipeline is to be built from Fostoria to Akron and the Plantation Pipeline is to be extended from Greensboro, N. C., to a point near Richmond, Va.

These two projects are part of OPC's co-ordinated pipeline program, and will increase oil supplies in the east by 45,000 bbls. daily.

Until the Ohio pipeline is completed OPC plans using Great Lakes tankers or barges for oil transportation between Toledo and Cleveland. (See story on page — for details of the interim plan.)

Preliminary surveys and other engineering details, OPC said, are being developed for the trans-Ohio pipeline which will link the Shell and Sohio systems with the Sun-Susquehanna system for delivery of oil to Susquehanna's eastern terminus at Newark, N. J.

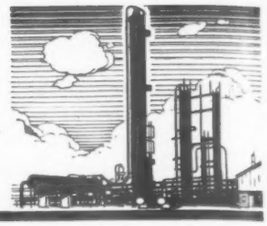
Expected to be completed before navigation closes on Lake Erie, the pipeline is to be made of second-hand pipe and financed by the government.

An OPC spokesman said the trans-Ohio line, to be financed by the government, would be built of 8 and 6-in. pipe. Efforts are being made now, he said, to find the second-hand pipe necessary.

The 165-mile extension of the Plantation Pipeline, financed by the government, will consist of second-hand 8-in. pipe. Engineers estimate that it can be completed within 100 days after all necessary materials are obtained. Cost is estimated at $3,000,000.

Beaumont Line Started

OPC reported that "work is already well under way" on construction of a feeder line from Beaumont to Baton Rouge (Plantation's southern terminus), and an installation of intermediate pumping stations on the Plantation Pipeline proper to increase capacity from 60,000 to 90,000 bbls. daily at Greensboro, thus making the extra 30,000 bbls. available to be pumped to Richmond.



Jersey Claims I. G. Processes Supply Several War Products

NPN News Bureau

WASHINGTON — Several war products now being used against the Axis powers were developed from German processes obtained by New Jersey Standard in its 1929 patent deal with I. G. Farbenindustrie, the German chemical trust, according to testimony Aug. 19, 20 and 21 by Jersey technical men before Senate patents committee.

One of these products was synthetic toluol, a basic ingredient for the explosive, TNT. Jersey developed this from a modification of the German I. G.'s hydrogenation process, according to R. T. Haslam, Jersey vice-president.

Develops Synthetic Toluol

"While working (between 1935 and 1936) on this process to improve anti-knock quality of gasoline," Mr. Haslam explained, "we discovered two things—first, that we could make toluol; second, that toluol so made could be nitrated. And that latter step is quite important."

During the last war, there was an acute shortage of toluol, then made from coal.

So, Jersey promptly reported its finding to Ordnance Department of the U. S. Army. The Army liked the two-gallon samples and came back for more—a lot of 20,000 gal.

Loses $100,000 On Army Order

"For a research laboratory to make that amount, was a tremendous task," Mr. Haslam added. "We undertook it, however. It meant shipping tank cars of the product from New Jersey to Louisiana, back from Louisiana to New Jersey, to process the material by each of the steps we had at those distant points."

"That cost us $100,000 more than the Army paid for the toluol," he added.

Praised by Army

Army officials nitrated this 20,000 gal., successfully making TNT.

A short while later, the Ordnance Department approved construction of a large plant by Jersey which was completed in October, 1941, two months before Pearl Harbor.

This plant, largest in the world, is now running at 50% over designed capacity. It is producing several times what was produced in the entire U. S. during last war, he added. The per-gallon cost is only 12 to 15% of what toluol cost the Army in 1918.

'Got 100-Octane Also'

Development — or at least acceleration of development — of 100-octane gasoline was also attributed to the oil hydrogenation process obtained from the German I. G. This was explained by E. V. Murphree, manager of Jersey's research and development department.

From a laboratory product costing $16 per gallon, Jersey, using the I. G. hydrogenation process, was able to reduce costs to a point where the U. S. Army in 1935 came to regard 100-octane as commercially feasible and asked Jersey to develop a supply, Mr. Murphree testified.

Alkylation Process Cited

The committee disputed Jersey's statement that the first 100-octane came from the hydrogenation process, thus adding another war product to the benefits from Jersey's deal with I. G. They asked if the alkylation process for 100-octane would not have been developed anyway. Mr. Murphree thought not.

He said that hydrogenation had encouraged search for other processes and had actually pointed the way to the alkylation method.

"The first isooctane was made by hydrogenating the material," Mr. Murphree continued. "That was the result of treatment of refinery gas with sulphuric acid. That was later improved so that you could double the yield by treating refinery gas with sulphuric acid and modifying the conditions. It was work along that process that resulted finally in development of the alkylation process."

Obtained Lube Additives

Two lube oil additives, now used extensively for military purposes (as well as civilian), were also credited to the I. G. deal by H. W. Fisher, Jersey technical man.

For years, Mr. Fisher testified, one of Jersey's chemists (Mr. Davis) had been seeking something to offset the freezing of wax in lube oils during cold weather. But he was not successful until in 1929 he went to Germany and visited the I. G. laboratories. They showed him a sample of synthetic lubricating oil made from paraffin wax and naphthalene. He brought back the formula, made some, and found that his hunch was correct—it acted as a pour-depressant (Paraflow) for certain lube oils.

Paratone, another lube oil additive to offset effect of heat or cold, was developed by Jersey from a sample bottle of Vistanex, a rubber-like substance, brought back from the I. G. laboratories by R. T. Haslam, in 1932, according to Mr. Fisher. He displayed the original bottle of Vistanex, dated March 24, 1932.

Skips C. R. A. Questioning

Committee counsel asked if Jersey had had any dealings with the I. G. in 1940 about the C. R. A. (Catalytic Refining Associates). Mr. Farish said he wasn't close enough to that matter to be able to answer. Counsel did not pursue the C. R. A. question.

Explains Methane Steam

Jersey helped, rather than hindered, explosive manufacturers to get clearance for use of the methane steam process, according to testimony of Frank A. Howard, president of the Standard Oil Development Co.

Justice Department had contended that Jersey had assignment of I. G. hydrogenation patents yet refused to license American powder companies to make ammonia by the methane steam process as late as spring of 1941.

Howard Tells of Efforts

Here is how Mr. Howard answered that:

Jersey did have assignments of these—and some 2000 other patents, obtained by Mr. Howard at the Hague in September, 1929—from the German firm to Standard-I. G. However, by the 1929 agreement Jersey's interest in these patents was limited to using hydrogenation processes in the oil or coal field only. Jersey could not, therefore, license the powder companies to use the methane steam process in the chemical field, that is, to make ammonia used in explosives.

The I. G. company ignored inquiries for licenses. So Jersey urged the powder companies have our government order them to ignore the German patent and go ahead. But the powder companies held back.

Jersey Cuts the Knot

Finally, Jersey took it upon itself to go to the government and have the "Gordian knot" cut.

Chairman Bone and Counsel Fath of the committee thought this was a good example of how the patent law snarled the American defense effort before Pearl Harbor.

Senator Clark, Idaho, however, pointed out that Jersey could not have done otherwise without violating its contract (assuming there was a valid contract). He said the powder companies were more to blame than anyone else for not having gone to the government on their own hook.

Jersey contended that except for its deal with I. G. the U. S. wouldn't have had the methane steam or any of the hydrogenation patents.

Refinery Operations

(American Petroleum Institute figures in barrels of 42 gallons. Figures are U. S. totals and are on a Bureau of Mines basis. Breakdown by districts will be published in Sept. 2 NPN.)

	Week Ended Aug. 22, '42	Week Ended Aug. 15, '42	Week Ended Aug. 23, '41
Crude runs to stills (Da. avg.)	3,723,000	3,711,000	4,041,000
Gasoline production at refineries including natural blended	11,255,000	11,125,000	13,577,000
Finished & Unfinished gasoline stocks	80,443,000	80,708,000	81,194,000
Gas oil & distillate stocks	40,416,000	40,041,000	46,081,000
Residual fuel oil stocks	78,007,000	77,422,000	92,996,000

See More Emphasis On 'Quick' Program For Making Rubber

NPN News Bureau

WASHINGTON — Cancellation of the Gary, Ind., synthetic rubber project leads to expectation here that RFC will drastically revise its synthetic rubber program to throw the bulk of butadiene production to the "quick" method using converted refining facilities.

The Gary plant was to be built by Rubber Synthetics, Inc., and Dow Chemical. Rubber Synthetics, Inc., is composed of Indiana Standard, Cities Service and Sinclair.

Announcing the cancellation as a "deferment" of the project, RFC said it was found that the same amount of butadiene could be obtained from existing facilities.

May Switch Program

RFC's action lent weight to a report that Rubber Reserve Co. may cancel half the "permanent" butadiene plant projects.

A high RFC official connected with rubber said, however, that deferment of the Gary plant was not a fore-runner of other cancellations.

Present facilities—with the addition of purification equipment — could be in a position to give the U. S. butadiene at the rate of 950,000 tons a year within 6 months, NPN was told by an official close to the policy-making counsellors of war.

Of this, 350,000 tons of butadiene would come from 3-way refinery units and 600,000 tons from refinery conversion—the "quick" plan.

Styrene Included

Re-shuffling of the synthetic rubber program, which presumably will be completed within a short time, also contemplates the scrapping of plans for some styrene plants with the oil industry furnishing styrene in addition to butadiene, according to the report. Converted refineries would be called upon to make styrene.

Much of the butadiene, however, would have to come from plants already planned, because they are involved in the triple production of butadiene, toluene and 100-octane gasoline, a reliable source said.

Biggest bottleneck in such a large scale expansion of butadiene output would be purification equipment for the "quick" program. Nevertheless, it is thought by some that the critical materials necessary for purification would come from the deleted butadiene plants.

Doctor Sweetening Faces Ban

NPN News Bureau

WASHINGTON — Doctor sweetening of gasoline, by any method involving the use of critical chemicals or materials, will be banned under an order being prepared here. It will apply to refiners in all districts.

Such a move has long been in the offing. At the National Petroleum Assn. meeting in Cleveland last April Wright Gary, then OPC refining director, said that WPB's chemical division was pressing for action to eliminate doctor sweetening.

Synthetic Acetone, Butyl Alcohol Set At New 'Ceilings'

NPN News Bureau

WASHINGTON—Prices for synthetic acetone and butyl alcohol were pegged at the maximum prices for the fermentation products or the synthetic seller's highest March, 1942, price—whichever is lower—in Revised Price Schedules 36 and 37.

Price Administrator Henderson said the change was made because the price for synthetic acetone and butyl alcohol remained stable, leading some buyers to purchase the synthetic products at the lower price and re-sell at the higher ceiling set for fermentation products.

Synthetic Prices Even

The synthetic products, OPA said, have remained at the level of 7c per lb. for acetone and 10.75c per lb. for butyl which were set as the ceiling by the original price schedule. Synthetic prices did not advance in accordance with an increase in the ceiling to 15.8c last December.

Because manufacturers of the fermentation product have switched from high-cost molasses to lower-cost grain, OPA reduced the prices for fermentation acetone to 8.5c per lb. and to 12.5c per lb. for normal fermentation butyl alcohol.

Synthetic acetone and butyl alcohol are to sell at these prices as their ceiling or at the highest March price, whichever is lower, OPA said.

'Selfishness' Blocked Alcohol-Rubber, House Agriculture Chairman Charges

NPN News Bureau

WASHINGTON — Selfishness on the part of WPB Chairman Nelson's technical advisers blocked allocation of critical materials for manufacture of synthetic rubber from agricultural alcohol, Chairman Fulmer of House agriculture committee charged Aug. 17 in a letter to Bernard Baruch, heading President Roosevelt's rubber investigation. He said most of Mr. Nelson's rubber advisers represented oil interests.

Mr. Fulmer contended that a "bad mistake" was made in not promoting immediate manufacture of "alky-rubber". He suggested that Mr. Baruch's advisers would obtain valuable information from Gillette Committee hearings on:

Says Oil Interests Dominate

"First as to why nothing has been done up to this good hour in the way of manufacturing synthetic rubber; second, just why a certain small amount of critical materials has not been allocated to certain industries which are anxious to proceed immediately in the manufacturing of synthetic rubber from alcohol; and third, the reason for the refusal by those in authority to allocate this small amount of critical materials was on account of the selfish attitude of the technical advisers of Donald M. Nelson, practically all of whom represent the petroleum interests."

Hits 'Alky' Opponents

Rep. Fulmer argued that "certain monopolists" oppose "alky rubber" for fear it will take the market away from them after the war. He said the "monopolies are composed of certain manufacturers of rubber and the petroleum interests."

"The country is awaiting your report," he continued, "and I can assure you that nothing would be more helpful in connection with our war efforts, and more gratifying to the people of this nation, than to have a strong favorable report from you, in behalf of an immediate setting-up of the manufacturing of rubber from alcohol."

Heat-Treating Equipment Under New Controls

NPN News Bureau

WASHINGTON—WPB has set up the machinery for setting production and delivery schedules of heat-treating equipment which are to be followed without regard to preference ratings.

In General Preference Order M-211, effective Aug. 22, WPB said manufacturers shall schedule production and deliveries in accordance with specific directions that may be issued from time to time.

"The production and delivery schedules established by any specific direction which may be issued from time to time shall be maintained without regard to any preference ratings already assigned or hereafter assigned to particular contracts, commitments or purchase orders and may be altered only upon specific directions of the Director General for Operations," WPB said.

Hikes Employe Wages

NPN News Bureau

CLEVELAND—Penn Service Oil Co. has announced a second "cost of living" wage increase to all employes, effective Aug. 1. Company headquarters are at Reading, Pa.

National Safety Congress Convention Changed

NPN News Bureau

CHICAGO—Three Chicago hotels —the Sherman, La Salle, and Morrison—have been chosen for the 31st National Safety Congress and Exposition to be held Oct. 27, 28, 29, according to Paul Jones, publicity director. Headquarters for the convention, which will feature 200 sessions and 500 program participants, will be the Sherman.

The convention was originally scheduled for the Congress Hotel, but was changed when the government took over that building for military purposes.

PRODUCTION NEWS

'At Receiving Tank' Basis Fixed for Crude 'Ceilings'

NPN News Bureau

WASHINGTON—OPA's ceiling prices on crude were scheduled to begin using an "at the receiving tank" basis instead of an "at the well" basis on Aug. 26.

OPA issued Amendment 30 to Price Schedule 88, effective Aug. 26, on Aug. 21 to accomplish the change.

"The amendment provides a revised method for determining the maximum price for a well not producing on Oct. 1, 1941, the base-all production covered by a con-price date," OPA said. "It permits the contract price to be paid for tract price to be paid for all production covered by a contract regardless of whether the well was in production on Oct. 1, 1941.

Changes Basis

"This is accomplished by changing from an 'at the well' basis to an 'at the receiving tank' basis.

"This change was advisable, OPA officials said, as a single contract often covers the output of wells which were producing and those which were not producing on Oct. 1, 1941. The method for pricing production of the non-producing wells as originally established made necessary segregation and separate measurement of the crude petroleum in each category and resulted in wasteful duplication of storage facilities.

"The amendment broadens the provision which permitted contract prices in excess of posted prices to be charged for sales of crude at the well, and also permits the premium price to be charged for sales at a point away from the well."

Text of Amendment

Text of the amendment follows:

TITLE 32—NATIONAL DEFENSE
Chapter XI—Office of Price Administration
PART 1340—FUEL
[Amendment 30. To Revised Price Schedule 88[1]]
PETROLEUM AND PETROLEUM PRODUCTS

A statement of the considerations involved in the issuance of this amendment has been issued simultaneously herewith and has been filed with the Division of the Federal Register.*

Paragraphs (h) and (i) are revoked and a new paragraph (s) is added to § 1340.157, and §§ 1340.154 (b) and 1340.159 (a) are amended to read as set forth below:

§ 1340.154 *Records and Reports* * * *

(b) Where a contract of the type described in paragraph (a) (3) of §1340.159 was in effect as of October 1, 1941 duly authenticated copies of such contracts shall be filed with this Office within thirty days after August 26, 1942.

* * * * *

§ 1340.157 *Definitions* * * *

(s) "Receiving tank" means the tank of the producer of crude petroleum, sometimes called stock tank or shipping tank, in which the oil from one or more wells is first gauged or measured for sale, delivery or storage.

* * * * *

§ 1340.159 *Appendix A: Maximum prices for petroleum and petroleum products.* * * *

[1]7 F.R., 1107, 1371, 1798, 1799, 1836, 2304, 2352, 2634, 2945, 3116, 3482, 3524, 3576, 3552, 3895, 3963, 4483, 4653, 4854, 4857, 5481, 5867, 5868.

*Copies may be obtained from the Office of Price Administration.

(a) *Crude petroleum* (1) The maximum price at the receiving tank for crude petroleum from any given pool shall be the posted purchase price as of October 1, 1941 for such pool.

(2) Where on October 1, 1941, there was for any given pool no posted purchase price, or more than one posted purchase price, the maximum price at the receiving tank for crude petroleum from such pool shall be the price paid for crude petroleum at the same receiving tank as of October 1, 1941, unless this price is below the lower or lowest of the posted purchase prices, if any, and in that case, the maximum price shall not be in excess of such lower or lowest posted purchase price.

(3) Where a contract was in effect on October 1, 1941 for the purchase of crude petroleum at the receiving tank at a price in excess of any posted purchase price for the given pool applicable to such production or for the purchase of crude petroleum at a point other than at the receiving tank at a price in excess of the sum of such posted purchase price and the differential between such posted purchase price and the price at such other point in existence on October 1, 1941 such contract price shall be the maximum price at the receiving tank or at such other point for the production covered by the contract, or any renewal of such contract, or a new contract between the same buyer and seller concerning the same production.

(4) Where the maximum price for any sale of crude petroleum at the receiving tank cannot be determined under (1) through (3) above, the purchaser may set a temporary price for such crude petroleum subject to the provisions of § 1340.154 (c) above and subject also to disapproval of the Office of Price Administration. If such temporary price is a posted price, it shall, unless disapproved in writing by the Office of Price Administration within 30 days after it has been reported, be the maximum price at the receiving tank for any crude petroleum produced from the pool from which crude petroleum covered by the sale in question is produced. This provision also covers crude petroleum produced from wells representing discovery and development of the new pools subsequent to October 1, 1941.

(5) The maximum price for crude petroleum purchased at a point other than the receiving tank shall be at no greater differential at such point over the maximum price for such crude at the receiving tank than existed on October 1, 1941. If no differential existed at the given points on that date, the purchaser and seller may establish a temporary differential for a sale of crude petroleum at such point subject to provisions of § 1340.154 (c) hereof and subject also to disapproval by the Office of Price Administration: *Provided, however,* That if such differential is not disapproved in writing by the Office of Price Administration within 30 days after it has been reported in accordance with § 1340.154 (c), it shall be the maximum differential for the particular sale and for all subsequent sales of crude petroleum from the same receiving tank delivered at that point.

§ 1340.158a *Effective dates of amendments* * * *

(dd) Amendment No. 30 (§§ 1340.157, 1340.159 (a) *Crude petroleum*) to Revised Price Schedule No. 88 shall become effective August 26, 1942. (Pub. Law 421, 77th Cong.)

Issued this 21st day of August 1942.

LEON HENDERSON,
Administrator.

Stevenson Names Beauford Jester To Sadler's Post

Beauford Jester

Special to NPN

AUSTIN—Beauford Jester, a newcomer in Texas politics, was appointed by Gov. Stevenson Aug. 24 to fill the unexpired term of Jerry Sadler as Texas railroad commissioner. Mr. Sadler resigned to go into the Army, then withdrew his resignation and continues to attend Commission hearings in his uniform.

Mr. Jester, a Corsicana lawyer and former chairman of the University of Texas board of regents, previously won the Democratic nomination for the office. He now steps in, as a result of the governor's appointment, to do the job until Jan. 1 when the elected commissioner will take office.

Some observers anticipate that Mr. Jester may be forced to a court battle with Mr. Sadler.

OPC Recommends September Output Of 4,066,500 b/d

NPN News Bureau

WASHINGTON — Recommended September production of crude oil and other petroleum liquids has been set at 4,066,500 b/d by Office of Petroleum Coordinator. This is an increase of 28,000 b/d over certified rates for August.

Continually increasing military demands in the Pacific area brought a recommendation from OPC for an increase of 24,300 b/d in California. This was the fifth consecutive increase. Otherwise, September rates for the oil producing states were substantially unchanged from August.

Following are the September certifications, compared with August:

District and State	Sept. '42 Total Petroleum Liquids	Aug. '42 Total Petroleum Liquids
District I		
New York	15,200	15,300
Pennsylvania	52,300	52,800
West Virginia	16,600	17,300
Total	84,100	85,400
District II		
Illinois	289,200	289,300
Indiana	19,300	20,600
Kansas	285,300	281,900
Kentucky	14,000	14,100
Michigan	66,700	66,800
Nebraska	3,900	4,100
Ohio	11,200	10,500
Oklahoma	415,300	415,500
Total	1,104,900	1,102,800
District III		
Arkansas	81,900	81,600
Louisiana	334,800	332,600
Mississippi	50,200	50,000
New Mexico	98,100	97,300
Texas	1,397,800	1,396,700
Total	1,962,800	1,958,200
District IV		
Colorado	7,000	7,200
Montana	22,800	22,700
Wyoming	93,400	95,000
Total	123,200	124,900
District V		
California	791,500	767,200
Other	.....	.....
Total United States	4,066,500	4,038,500

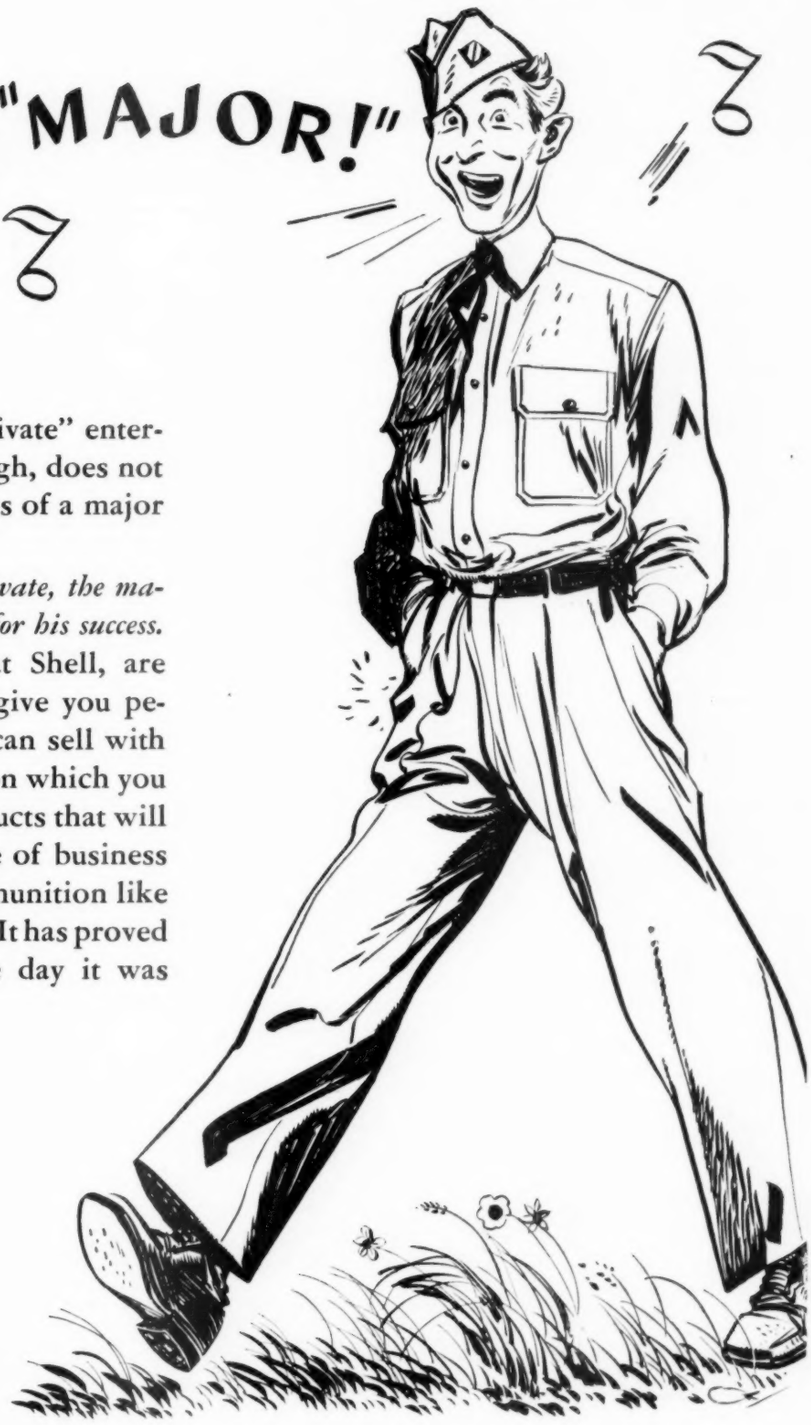
Texas Lowers Quota For September

Special to NPN

AUSTIN — Texas in September will produce about 46,833 b/d less than it did under its August allowable, according to the figure in a Railroad Commission production order just issued.

The commission announced that there would be 21 general production days, and that the daily per-

I'D RATHER BE A PRIVATE THAN A "MAJOR!"



THE oil jobber's "private" enterprise, happily enough, does not have the responsibilities of a major oil company.

But, like the army private, the major is dependent on him for his success. That's why we, here at Shell, are striving constantly to give you petroleum products you can sell with utmost confidence . . . on which you can make money. Products that will help you win the battle of business on the sales front. Ammunition like Shell X-100 Motor Oil. It has proved a best seller from the day it was announced.

OIL IS Ammunition -USE IT WISELY

SHELL

SHELL OIL COMPANY, INCORPORATED

missible output would be 1,430,363 bbls. Engineers estimated, however, that actual production would be close to 1,353,409 barrels, or 44,391 less than the Office of Petroleum Coordinator had recommended for the month. This was computed on the basis of a normal underproduction of 5.38%, which was the figure recorded for June.

August exemptions from closing days because of war crude production were continued in September, with a Vogtsberger field added to the list.

Oklahoma Demand Hearing Set for September 1

Special to NPN

OKLAHOMA CITY—Sept. 1 has been set as hearing date to take evidence of demand for crude oil and distillate for September, according to Oklahoma Corporation Commission announcement. Hearing will be held in commission's courtroom at 11 a.m. Allowable to be set will not exceed quota recommended by Office of Petroleum Coordinator, officials said. OPC has set 415,300 b/d as September figure, 200 bbls. below August.

Preceding the hearing there will be an informal discussion of demand for crude from various prorated and unprorated fields of the state between purchasers, producers and commission officials.

Kansas Hikes Allowable

Special to NPN

TOPEKA—Kansas' certified total production of all petroleum liquids has been set at 285,300 b/d by Kansas Corporation Commission, according to J. A. Robertson, chairman. September figure is same as that recommended by Office of Petroleum Coordinator and 3400 bbls. above August quota.

U. S. Crude Stocks

NPN News Bureau

WASHINGTON—Stocks of U. S. and foreign crude dropped slightly during week ended Aug. 15, totaling 246,433,000 bbls., Bureau of Mines has reported, compared with 246,975,000 bbls. on Aug. 8.

However, Texas increased 352,000 bbls., totaling 99,358,000 bbls. and Oklahoma also was up, increasing 267,000 bbls. The largest decreases were reported in Illinois-Indiana area, down 617,000 bbls.; Louisiana, down 385,000 bbls.; New Mexico, down 186,000 bbls. and Mississippi, down 126,000 bbls. Other area changes were small.

Tariff Commission Starts New Survey On Oil Production

NPN News Bureau

WASHINGTON — Tariff Commission is branching out into a new survey of crude production costs because of war's impact on the oil industry.

Instead of covering everybody, the new survey is directed to a select list of pools and fields. Companies operating in those areas are to fill out 2 questionnaires—one for the company's entire production and the other for the specific fields listed in a letter to each company.

The new survey covers the last quarter of 1941 and the first 2 quarters of this year. Information requested is desired by Sept. 22.

Peacetime Survey Outmoded

Pointing out that the crude cost survey had been completed for OPA, Acting Secretary E. M. Whitcomb of the Tariff Commission wrote:

"The results of this survey covering 1939, 1940 and January-September, 1941, were believed to portray accurately conditions as they existed during the period under study. Conditions, however, have since changed drastically as the country has shifted from a peacetime economy to an all-out war effort.

"Because of the widely scattered operations, the diverse conditions under which petroleum is produced, and the many essential products derived therefrom, the petroleum industry has felt the repercussions to a greater extent, perhaps, than any other segment of our economy.

"For that reason, it has been decided to ascertain the trend of costs over the past several months. A select list of pools and fields will be surveyed, and some additional figures on your company's operations are desired."

Information sought includes income, engineering and well data, analysis of operating costs, and an analysis of general overhead and administrative expenses.

Tariff Commission said the questionnaires are being sent to about 595 companies in the following pools and fields:

California—Kern River, Midway-Sunset, Santa Maria Valley, Brea-Olinda-Lahavra, Santa Fe Springs; Wyoming—Oregon basin and Lance Creek; Montana—Kevin Sunburst; Colorado—Iles Dome and Wilson Creek; Texas—Ector and East Texas proper; Oklahoma—Northeast Oklahoma and Seminole; Kansas—Bemis-Walters; Louisiana—Rodessa, Cotton Valley, and Golden Meadows; Arkansas—Magnolia and Smackover; New Mexico; Mississippi; Illinois—Louden pool; Michigan — Central. Others will be selected from the eastern area.

Plan Natural Gas Storage In California Oil Field

NPN News Bureau

LOS ANGELES—In an attempt to avert a possible serious shortage of natural gas in Southern California this winter, the state Railroad Commission has announced plans to use the old Playa del Rey oil field on the outskirts of Los Angeles as an underground storage tank.

Under the plan the federal government would take over the 240-acre field and pump surplus gas from other California fields into the underground reservoir. It is estimated that, during the warm months still remaining, the field could be "pumped up" enough to permit withdrawal of 20 to 25 million cu. ft. per day throughout the cold spells this winter—enough to meet probable peak shortage of 16,000,000 cu. ft.

If the plan goes through, experts estimate that gas storage can begin 30 days after the field is taken over by the government.

Carter Buys Leader

NPN News Bureau

TULSA—Carter Oil Co. here has announced purchase, for an undisclosed sum, of all stock in the Leader Oil Co., marking one of the first major sales for 1942. Principal stock holders of Leader are F. B. Parriot, Tulsa, as president, and the estate of Parriot's late partner, W. I. Southern.

Japan May Have Restored Dutch Wells With U. S. Oil Equipment, BEW Reports

NPN News Bureau

WASHINGTON—A hint that by now Japan may be obtaining part of her petroleum requirements from the conquered Dutch East Indies came from Board of Economic Warfare which reported that unprecedented Japanese purchases of oil equipment in this country in 1939 is further evidence that she was planning aggression that long ago.

Immediately after war began, NPN reported (*Dec.* 10, 1941 *p.* 15) that Japan's oil stockpile was big enough to last only 18 months in wartime.

A.P.I. Petroleum Facts and Figures placed 1940 consumption of Japan at 26,000,000 bbls., against a domestic production of 2,639,000 bbls., against a domestic production of 2,639,000 bbls. and 4,000,000 bbls. from Sakhalin.

Netherlands Indies—with a 1940 production of 60,830,000 bbls. and a daily refinery capacity of 160,000 bbls. of crude in the same year—supplied Japan with 25% of her requirements during peacetime.

In 10 years preceding 1939, BEW reported, Japanese equipment purchases here had been small—sporadic, in fact. But in 1939, and until 1941, "Japanese firms suddenly began purchasing oil field equipment particularly adaptable to the comparatively shallow wells in the Dutch Indies".

True, the Dutch fields were scuttled—partially at least.

But BEW recalled that a Japanese spokesman said shortly before Pearl Harbor:

"Preparations have been made to wreck oil wells in Netherlands India in case of emergency. This is something we anticipated because it is very easy technically . . . but I must emphasize here that we have counter-measures to meet this situation."

Japan bought light equipment, BEW added, which "oil experts consider as ideal for purposes of reconditioning partially destroyed wells or drilling new ones, particularly in the Pamoesian oil wells of Tarakan, which have a depth of from 1500 to 1600 feet."

Outcome Uncertain

"How far the Japanese have been able to restore the wells and refineries is not clear from official information so far available," BEW said. "The destruction throughout the Dutch Indies and Borneo has been reported in practically all dispatches as very extensive, but, in view of the evacuation, it is difficult to say that it was absolutely complete in all cases or to indicate how much time will be required to repair it.

"So far as the oil fields are concerned, destruction or demolition seems to have been very extensive. With 200 or 300 wells in a particular field, however, it is not always possible to say that each individual well is destroyed or that the destruction in each case was complete."

Oil TRANSPORTATION

Tank Car Gasoline Shipments Banned by OPC in 20 States

NPN News Bureau

WASHINGTON—OPC's ban, effective Aug. 24, on gasoline shipments by tank car in 20 mid-western and southwestern states was accompanied by an expression of optimism by railroad officials that peak railroad traffic in the fall would not interfere with oil movement.

Rail officials expect eastward tank car movements to exceed 1,000,000 b/d before long.

OPC said Directive No. 57 prohibited tank car shipment of "any automotive gasoline for commercial distribution from any point within the United States to any point within the states of Texas, Louisiana, Mississippi, Alabama, Oklahoma, Arkansas, Tennessee, Kentucky, Missouri, Kansas, Nebraska, Iowa, Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota, North and South Dakota."

May Free 7000 Cars

From 5000 to 7000 tank cars would thus be freed for eastern service, Deputy Co-ordinator Davies said, making is necessary for the Mid-West and Southwest to rely on pipelines, barges and trucks for gasoline service.

Subject to OPC review, the directive provided for co-operative action in buying, selling, lending or exchanging of products, plus joint use of terminals, transportation and distribution facilities.

The directive said "the Supplies and Distribution Subcommittees for Districts Two or Three shall, subject to the direction of the Director of Supply, Office of Petroleum Co-ordinator for War, or of such District Director as he may designate, arrange for such common purchases, sales, exchanges and loans of petroleum products and for such common use of transportation, terminal or distribution facilities as may be necessary to attain maximum efficient utilization of all available transportation, supply and distribution facilities, as will insure the maintenance of adequate supplies of petroleum products through the area included within the states."

The directive does not apply to shipments by or for the Army, Navy or "other agency, bureau or department" of the federal government.

Persons who can show that compliance with the directive will result in non-delivery of gasoline necessary for agricultural production, continued essential operation of industrial establishments or for maintenance of public health or safety may apply to the OPC district director of transportation for either District 2 or 3 for special written authorization to deviate from the requirements. Authorizations will be granted if it is satisfactory to the district director that alternative steps—pooling, exchanges, etc.—would be impossible, impracticable or insufficient to meet essential requirements.

OPC said the directive shall terminate, "insofar as the commencement of any new action by any person is concerned, upon the issuance and promulgation by the War Production Board of an order requiring direct allocation of materials movement by railway tank car."

"With the increased efficiency achieved in the handling of tank car movements by the railroads and the oil companies, it is now possible to utilize more cars in the Atlantic Coast service," Mr. Davies commented.

"It has been the policy of this office to provide additional tank cars for hauling oil to the East Coast shortage area as rapidly as the railroads and the oil companies could handle them. The number so assigned to the East Coast run has now risen from about 1000 to a total of approximately 70,000 and more now can be effectively employed."

Uses 70% of Cars

He pointed out that the additional tank cars would place nearly 70% of oil tank cars on eastern routes. Mr. Davies emphasized that the oil companies and the railroads feel sure they can use these cars, but "if experience proves otherwise, the cars can always be returned."

Mr. Davies was cautious about the prospect of mid-western rationing as a follow-up of the order. He said it remains to be seen whether rationing will be necessary in these areas as a result of diverting the tank cars.

"It has seemed only fair that the burden growing out of a condition of war be distributed as widely as possible. On the other hand, if the regions losing the transportation can locally solve their problem otherwise, well and good," he said. "There is no point in rationing if there does not in fact exist a physical necessity for it."

An OPC spokesman said the freed tank cars would add 100,000 b/d to eastern supplies, but the Association of American Railroads estimated 85,000.

A.A.R. pointed out that the 85,000 plus last week's 830,000 would mean 915,000 b/d.

See 1,000,000-Bbl. Goal

With solid-train movement steadily increasing, A.A.R. added, a daily rate of 1,000,000 bbls. should be reached by Oct. 1. One guess is as good as another as to whether such a rate could be maintained, but the A.A.R. said the railroads are in a much better position to handle peak fall traffic than last year.

This is due to an increased number of locomotives. From Jan. 1 through July 31 of this year, Class I railroads placed 432 locomotives in service, giving them an ownership of 41,566 locomotives, including 26,144 freight engines.

Overland rail movement to the East now is using nearly 70,000 cars and 1400 locomotives.

To supply the East, oil companies are loading 4000 tank cars daily. ODT estimates that 75% of these cars are being used in solid-train lots.

ODT field reports said that 8 additional daily trains, including the cars of small producers, would begin moving during the week ending Aug. 22.

'Gas' Tax Revenue Drops

NPN News Bureau

WASHINGTON — Federal gasoline tax collections for July dropped about 10% under a year ago, totaling $30,444,750, against $33,730,346. Lube oil federal tax collections also dropped—$3,018,014 compared with $4,107,325, or about 25%.

At Secret Meeting, Some Oil Men Got Tip-Off on No. 57

NPN News Bureau

CHICAGO—Mid-western marketers, jobbers and the few refiners not represented at a two-day closed-door meeting in OPC District 2 offices here last week, were jolted by the Washington announcement of the ban on gasoline hauls by tank car in the 20-state area listed in Directive 57.

Refinery representatives and other oil men attending the meeting, to which NPN was denied admittance, were reported to have been asked to bring with them itemized lists of refinery output and demand, showing where all material went and how. They were then asked, it is reported, how much over and above their present contract commitments they could send to the East Coast to meet an immediate demand for a specific quantity of products.

When all figures were added up, it was found the supplies were available, but transportation wasn't. This, it is said, led to the issuance of Directive 57 and gave oil men who attended the secret meeting, and those they told about it afterwards, advance notice of the order, oil men who did not attend charge.

Hope to Meet Demand

Oil men here, however, are generally hopeful, if not confident, that demands can be met. They look upon the degree of success in meeting requirements without use of tank cars as determining necessity for rationing. Deputy Co-ordinator Davies has said OPC would take transportation first, then see if rationing were necessary second.

There are extensive territories, however, in the Dakotas, Minnesota and the upper reaches of Michigan, which are dependent upon the railroads. Supplying these areas by truck is difficult; impossible, some oil men say, on the short notice given before Directive 57 became effective. Already, bulk plants in some parts of Minnesota are dry and suppliers were struggling over the weekend for some means of relief.

You, Too, can strike

e a blow for Freedom!

Write, wire or phone your Senators and Congressman to support the Ellender-Patman Bills

Your Freedom of Business Enterprise is in Danger!

While our boys—maybe *your own son* amongst them—are battling on far-flung fronts to preserve America's freedom, one of the fundamentals they're fighting for—Freedom of Enterprise—is in grave danger right here at home. Its survival for those independents who sell tires, depends on the passage of the Ellender-Patman Bills (Bill S-2560 in the Senate and Bill HR-7156 in the House).

You can strike a blow for freedom by urging your Senators and Congressman to support these Ellender-Patman Bills now. If you want to preserve your own freedom of enterprise, if you want to protect at home the very freedom our boys are fighting for abroad, *TAKE ACTION NOW!*

Write, wire or phone your Senators and Congressman, TODAY!

Important Provisions of Senate Bill S-2560 and House Bill HR-7156

1. **PRESERVATION** of the independent dealer* and his organization by providing for the distribution of new and rebuilt tires and tubes *through independent dealers and service stations ONLY.*
2. **A COMPULSORY TIRE INSPECTION PROGRAM** authorizing *"independent tire dealers and service stations"* to act as official inspectors.
3. **A CAPPING PROGRAM** providing for the capping —by *independent dealers only*—of 30,000,000 tires a year with reclaim capping stocks.
4. **PRICE STABILIZATION**—making present ceiling prices the bottom prices and requiring every purchaser to turn in an old tire, *with no discounts or allowances.*

***INDEPENDENT DEALER IS DEFINED AS:**

"Any person engaged in selling and servicing tires, substantially all of whose business consists of one or more of the following activities: Selling or servicing (but not manufacturing) tires, automotive equipment, selling motor-vehicle fuels and lubricants or repairing, recapping, or retreading tires."

A message about these bills has been specially recorded by J. P. Seiberling, a leader in the fight to preserve Free Enterprise. No matter what make of tire you sell, call the Seiberling dealer nearest you and ask to hear this message, which is vitally important to your future, or request a recording free for your own use from Seiberling Rubber Co., Akron, Ohio.

Meanwhile—wire, write or phone your Senators and Congressman to support bills S-2560 and HR-7156. Do it NOW!

DEDICATED TO THE FIGHT FOR FREEDOM OF ENTERPRISE
BY J. P. SEIBERLING, PRESIDENT OF SEIBERLING RUBBER COMPANY

Northwest Congressmen Hit Tank Car Ban

Special to NPN

MINNEAPOLIS—Protests from northwestern congressmen over the ban on tank car shipments of gasoline and fuel oil on Aug. 24 and the stopping of barge movements above Cairo on the upper Mississippi River on Sept. 10 are voiced here.

Already protests have reached Washington from U. S. Sen. Joseph Ball; E. A. Purdy, chairman of the Minneapolis Civic and Commerce Assn's. oil and fuel committee; U. S. Sen. Henrik Shipstead and Henry Baskerville, president of the Western Oil and Fuel Co.

According to Sen. Shipstead, who believes there is still plenty of time to build a fleet of wooden barges, the edicts will cut the consumption of gasoline in Minnesota, by 50%.

Mr. Baskerville breaks up gasoline supplies serving Minnesota this way: 52 to 58% arrives by tank car; 30% by pipeline; and 13 to 18% by river barge.

Sen. Ball, in a telegram to Deputy Coordinator Davies, urged that limitation of Mississippi river shipping be delayed from the scheduled Sept. 10 until the first of the year.

Mr. Purdy tried to reach Coordinator Ickes by telephone for "Specific answers to some specific questions," and had no success.

Congressman Oscar Youngdahl of Minnesota has wired all members of the Minnesota congressional delegation to attend a luncheon Aug. 25 in Minneapolis to confer with Twin Cities officials. Purpose is to evolve a definite plan to protect city and farm users.

Oil Men Decry Abruptness Of Directive 57

NPN News Bureau

TULSA—Mid-Continent oil men were grumbling early this week over the short notice they received on the tank car ban on gasoline shipments. To minimize confusion in shifting all gasoline hauls to trucks, pipelines and barges, they feel they should have been given more advance information.

Other than of the abruptness of the OPC Directive 57, talk in Mid-Continent oil circles centered on its possible effects on refinery operations, with many oil men of the opinion that it meant another shut back in gasoline output. One Texas refiner said if no exceptions were provided to prevent hardships for the "li'l fellers" there will be a "lot of refineries shut down—including ours."

Lake Hauls to Link Pipelines Until New Ohio Line Is Ready

NPN News Bureau

WASHINGTON — Great Lakes tankers and barges, hauling from Toledo to Cleveland, will link two more pipeline systems to deliver an additional 15,000 b/d of petroleum products to the East Coast, according to OPC Plan 19 approved Aug. 14.

Originally, under the secondhand pipeline program (OPC Recommendation No. 49) it was planned to build a line from Fostoria, Ohio, to Akron, Ohio, to link the Sun-Susquehanna system, reversed, to the Shell-Sohio system. But it was decided that, pending the building of such a line, lake tankers and barges would be used.

Products transported through the new hook-up may be the products of the four companies (Shell, Indiana Standard, Ohio Standard or Sun) whose lines are involved "or such products may be owned by and transported for others", the OPC plan stated.

Plan Summarized

Briefly, OPC Plan 19 provides for:

Indiana Standard to transport 8000 b/d of gasoline through its Whiting-Indianapolis line as far as Zionsville, Ind., where a connection would be made with the Shell line coming up from Roxana (Wood River), Ill.

Shell's line between Zionsville and Lima, Ohio, is to be enlarged from 15,000 to 23,000 b/d capacity.

From Lima, Ohio Standard's line will move 8000 b/d of products to Toledo. This 8000 b/d, plus an additional 7000 b/d originating at Toledo, will go by lake tanker and barge to Cleveland. There, the 15,000 b/d will be delivered to western termini of the Sohio and Sun lines.

Sohio's Cleveland-Akron line is to be connected, with a new 6-mile link, to the Sun-Susquehanna line at Randolph Station, near Akron.

May Use Trucks, Too

If the Sun line and the Sohio line, both coming down from Cleveland, are not able to handle the 15,000 b/d delivered to them from the West, then these two companies are to arrange for supplementing the lines with transport trucks.

Step-by-step details of this program, as set forth in OPC Plan 19, follow in full text:

§1505.81 (3) of Recommendation No. 49, Part 1505—Transportation, provides with respect to Pipe Line Project No. 3 as follows:

> "The construction of a 15,000 barrels per day products line from Fostoria, Ohio, connecting Shell and Sohio's gasoline pipe lines with the Sun-Susquehanna system at Akron, Ohio, for the movement of petroleum products eastward."

The construction of a connecting line between Shell and Standard Oil Company (Ohio) systems and the Sun-Susquehanna system will take some time to complete. In the meantime, other arrangements required by Project No. 3 are nearing completion and it will be possible to commence the movement of petroleum products into District No. 1 through Project No. 3 facilities by utilization of lake transportation between Toledo and Cleveland, Ohio. In accordance with the provisions of Section 1505.78 of such Recommendation No. 49, and in furtherance of Pipe Line Project No. 3, the following interim plan is submitted in order to bring about the earliest possible utilization of Project No. 3 facilities as they become available:

1. Shell Oil Company, Incorporated, hereinafter designated as Shell, owns and operates, as a private carrier, a petroleum products pipe line extending from Shell's refinery at Roxana, Illinois, to Columbus, Ohio, by way of Lima and Springfield, Ohio. Shell shall construct a new pump station at Muncie, Indiana, for the purpose of increasing the capacity of Shell's pipe line between Zionsville, Indiana and Lima, Ohio, from 15,000 barrels per day to 23,000 barrels per day.

2. Standard Oil Company (Indiana) hereinafter designated as Standard, owns and operates, as a private carrier, a petroleum products pipe line extending from its refinery at Whiting, Indiana to Indianapolis, Indiana. Standard shall arrange for the connection of Standard's pipe line and Shell's pipe line at Zionsville, Indiana. Standard shall provide, by sale or other method, and transport and deliver through its pipe line up to but not more than 8,000 barrels per day of gasoline into Shell's said pipe line at Zionsville, Indiana for transportation in Shell's pipe line to Lima, Ohio and delivery to Standard Oil Company (an Ohio corporation) hereinafter designated as Sohio.

3. Sohio owns and operates, as a private carrier, a products pipe line which connects with Shell's said pipe line at Lima, Ohio and extends north to Toledo, Ohio, the capacity of which line is adequate for the transportation of petroleum products in the performance of this plan, and Sohio shall transport the products delivered to it at Lima by Shell through said pipe line to Toledo, Ohio under this plan.

4. The products transported to Toledo as outlined above, together with an additional quantity of approximately 7,000 barrels per day of gasoline which will originate at Toledo, shall be carried from Toledo, Ohio to Cleveland, Ohio by lake tanker or barge. Such products shall be delivered to Sohio and/or Sun Oil Line Company at Cleveland, Ohio for movement through the facilities mentioned hereafter.

5. Sohio owns and operates, as a private carrier, a products pipe line extending from Cleveland, Ohio to Akron, Ohio. Sohio shall connect such pipe line with the Sun-Susquehanna system hereinafter mentioned at Randolph Station, by the installation of approximately six miles of pipe line. Sun Oil Line Company owns and operates, as a common carrier, a products pipe line extending from Cleveland, Ohio to Randolph Station near Akron, Ohio. Capacity sufficient to transport 15,000 barrels per day of products from Cleveland to Randolph Station can be made available in the aforementioned pipe lines, supplemented by transport truck facilities if necessary, and Sohio and Sun Oil Line Company shall make such arrangements as are necessary to make available such 15,000 barrels per day of capacity from Cleveland to Randolph Station and shall transport and deliver to Sun-Susquehanna hereafter mentioned at Randolph Station the products delivered to them at Cleveland under this plan.

6. The Sun Oil Line Company, Susquehanna Pipe Line Company and Middlesex Pipe Line Company, herein collectively designated as the Sun-Susquehanna system, own and operate products pipe lines extending from Newark, New Jersey westerly to Randolph Station, Ohio and northerly to Cleveland, Ohio. Sun-Susquehanna system shall move and reconstruct its pump stations in Ohio and Pennsylvania and reverse such pipe lines providing capacity for the movement from Randolph Station, Ohio to Newark, New Jersey of the products delivered to it at Randolph Station under this plan. All such products shall be transported through the Sun-Susquehanna system into District No. 1.

7. The 15,000 barrels per day of products transported in conformity with this plan may be the products of any one or more of the companies herein named or such products may be owned by and transported for others.

8. This plan shall be effective upon approval hereof by the Chief Counsel of the Office of Petroleum Coordinator for War and upon the direction of the Petroleum Coordinator for War or the Deputy Petroleum Coordinator to carry the same into effect, in conformity with the provisions of Recommendation No. 49 as amended.

August 14, 1942

Approval of Interim Plan Formulated to Carry Out Certain Provisions of Recommendation No. 49, as Amended

Recommendation No. 49 of the Petroleum Coordinator for War, issued May 11, 1942, amended June

10, 1942, provides in part as follows:

"1505.81. **Pipeline Projects.** Without limitation as to other projects or activities directed herein, the Temporary Joint Pipeline Managing Subcommittee and the Temporary Joint Pipeline Engineering Subcommittee shall immediately, in accordance with the provisions of this Recommendation, do all things as herein in this Recommendation set forth relative to the following pipeline projects: ° ° ° ° °

(3) The construction of a 15,000 barrels per day products line from Fostoria, Ohio, connecting the Shell and Sohio Gasoline Pipelines with the Sun-Susquehanna system at Akron, Ohio, for the movement of petroleum products eastward.

"1505.82. **Effectuating Plans.** Upon the approval by the Chief Counsel of the Office of Petroleum Coordinator for War of any plan prepared pursuant to 1505.78 and pursuant to the direction of the Petroleum Coordinator for War or the Deputy Petroleum Coordinator, the Temporary Joint Pipeline Managing Subcommittee, the Temporary Joint Pipeline Engineering Subcommittee, the General Committees for Districts One, Two and Three, and all persons, natural or artificial, engaged in the petroleum industry in Districts One, Two, or Three, who may be affected by any such plan, shall carry into effect the said plan according to its terms, conditions, and intent."

There has been submitted to this Office, by the Project Managing Subcommittee, pursuant to Sections 1505.82 and 1505.84, an interim plan for the rearrangement, expansion and extension of pipeline facilities for the purpose of increasing the eastward movement of petroleum products by 15,000 barrels per day through the Standard Oil Company (Indiana), Shell Oil Company, Inc., Standard Oil Company (Ohio), and Sun-Susquehanna systems. The interim plan provides for the temporary utilization of Great Lakes transportation facilities between Toledo and Cleveland, Ohio, pending completion of the projected pipeline from Fostoria to Akron, Ohio. The plan has been prepared, pursuant to the provisions of Recommendation No. 49 as amended, and has been properly submitted thereunder by the Project 3 Managing Subcommittee. The plan has been considered and found to be in furtherance of the purposes of said Recommendation No. 49 as amended, and I accordingly hereby approve the plan.

(Sgd) David M. Hudson
Acting Chief Counsel

August 17, 1942

Mr. Alexander Fraser, Chairman
Project 3 Managing Subcommittee
50 West 50th Street
New York, New York

My dear Mr. Fraser:

This will acknowledge your letter of August 13 and the enclosed interim plan for the rearrangement, expansion and extension of pipeline facilities for the purpose of increasing the eastward movement of petroleum products by 15,000 barrels per day, through the Standard Oil Company (Indiana), Shell Oil Company, Inc., Standard Oil Company (Ohio), and Sun-Susquehanna systems, prepared and submitted by you pursuant to Section 1505.81 (c) of Recommendation No. 49 as amended June 10, 1942.

The interim plan has been carefully considered in this Office and has been approved by the Chief Counsel. His approval of the interim plan is transmitted herewith.

Since the interim plan appears to be adequate to accomplish immediately the purposes of Section 1505.81 (c) of Recommendation No. 49 as amended, pending completion of the projected pipeline from Fostoria to Akron, and since it has the approval of the Chief Counsel, I direct, pursuant to Section 1505.82 of Recommendation No. 49 as amended, that the Temporary Joint Pipeline Managing Subcommittee, the Temporary Joint Pipeline Engineering Subcommittee, the Project 3 Managing Subcommittee, the Project 3 Engineering Subcommittee, the General Committees for Districts One, Two and Three, and all persons, natural or artificial, engaged in the petroleum industry in Districts One, Two, or Three, who may be affected by any such plan, shall carry into effect the said plan according to its terms, conditions, and intent.

Sincerely yours,
(Sgd) Ralph K. Davies,
Deputy Petroleum Coordinator.

ODT Sets Up Unit To Handle Control Of Waterway Haul

NPN News Bureau

WASHINGTON — ODT's new permit system, which goes into effect Sept. 10, gives it control over oil movements on the Great Lakes, inland waterways, and coastwise and intercoastal shipping. But no permits are required for movements eastward.

After defining vessels as "any water craft or other artificial contrivance of whatever description which is designed or converted for use, and which is used, or is capable of being, or is intended to be used as a means of transportation by water of liquid cargo in bulk", ODT said no one may operate a vessel in domestic transportation unless authorized by a general or special permit.

Eastern Movement Exempt

A blanket permit freeing general easterly and northerly shipments from the permit restriction was issued simultaneously.

The permit control was established in General Order 19 and the exception was in Suspension Order 19-1.

ODT reserved the right to tell operators when and where they may load, what cargoes they may carry, and where they may unload, regardless of any contract, charter, lease or other commitment.

But until a direction or order is issued by ODT, the order is not to be construed as cancellation of any contract, charter, lease or other agreement.

New ODT Unit Set Up

Administering the permit system is a new Division of Permit Research, headed by Ernst Holzborn, who has been director of Coastwise and Intercoastal Transport.

In his new capacity, Mr. Holzborn will be assistant ODT director in charge of all waterway transportation.

Fused into the new division are the divisions of Inland Waterways, Great Lakes and Coastwise and Intercoastal Transport. The 3 divisions, however, will retain their identity.

Mr. Holzborn's associate, Charles F. Kellers, will succeed him as director of Coastwise and Intercoastal Transport.

Glenn E. Taylor, assistant director of Inland Waterways, was named deputy assistant director of ODT to help Mr. Holzborn. A. T. Wood remains Great Lakes director and Edward Clemens continues as director of ODT's Inland Waterways unit.

The division also will develop statistics on water movement and the flow of traffic.

Since Mr. Holzborn is to direct all waterway transportation, it was taken for granted that his office would be the one to control the movements of the barges that are expected to result from the big oil barge program of RFC, Inland Waterways Corp., Army Engineers and ODT.

Build 900 Wood Barges

The barge program, it was learned, contemplates the construction of 900 wood barges, 500 of which will carry oil and 400 will be used to replace steel bulk cargo barges that will be converted to petroleum service.

An RFC official emphasized that the use of 400 wood barges to replace steel ones does not mean that 400 steel barges will be converted. He pointed out that many of the steel barges would be larger than the wooden craft and, therefore, more wood barges would be required.

Plans call for standardization of the barges—each with a 6000 bbl. capacity. On this basis, it was estimated that oil-barge capacity would be increased by 4,000,000 bbls.

Permit Exception Quoted

ODT's exceptions to permit restrictions follow:

(a) Crude petroleum and petroleum products ffrom any port or shipping point via the Gulf of Mexico or the Gulf Intracoastal Waterway to a destination east or north of the shipping point;

(b) Crude petroleum from points and places west of milepost 200 on the Gulf Intracoastal Waterway to points west of shipping point and east of milepost 300 on the Gulf Intracoastal Waterway;

(c) Crude petroleum from producing oil fields to refining centers located within 60 miles from point of origin;

(d) Crude petroleum and petroleum products northward and eastward along the Atlantic coast, by sea or by the Atlantic Intracoastal Waterway and adjacent and tributary waters, for delivery to any destination in the Atlantic seaboard area of the United States, except northward on the Hudson river above Peekskill;

(e) Petroleum products ffrom Baton Rouge, Louisiana, to New Orleans, Louisiana, for export or for shipment eastward and northward pursuant to the provisions of sub-sections (a) and (d);

(f) Crude petroleum and petroleum products northward on the Mississippi river as far as its junction with the Ohio river and eastward and northward on the Ohio river and its tributaries;

(g) Crude petroleum and petroleum products from the confluence of the New York State barge canal system with the Hudson river generally northward on the Hudson river to the head of navigation and generally southward on the Hudson river to New York harbor points;

(h) Crude petroleum and petroleum products ffrom any point or place on the Great Lakes to Buffalo or Oswego, New York, or to points on the New York State barge canal system including points on the Hudson river;

(i) Crude petroleum and petroleum products eastward on the New York State barge canal system;

(j) Crude petroleum and petroleum products on the Pacific ocean and waters adjacent and tributary thereto;

(k) Crude petroleum and petroleum products between points in the same harbor when the point of destination is not more than 35 miles distant by water from the point of origin.

ICC CALENDAR On Oil Trucking

Ulrich Oil Company Extension-Council Bluffs—No. MC-89213 (Sub-No. 2)—Public convenience and necessity found to require operation by applicant as a common carrier by motor vehicle of refined petroleum products in bulk, in tank trucks, from Council Bluffs, Iowa, and points in Iowa within 10 miles thereof to specified points in Nebraska, over irregular routes. Issuance of a certificate approved upon compliance by applicant with certain conditions, and application in all other respects denied. ° ° °

Swanson Petroleum Company, Inc. Common Carrier Application—No. MC-103317 (Sub-No. 1)—Public convenience and necessity found not to require operation by applicant as a common carrier by motor vehicle, of refined petroleum products in bulk, in tank trucks, from Council Bluffs, Iowa, and points within 10 miles thereof, to points in Boone, Platte, Butler, Dodge, and Saunders Counties, Nebr., over irregular routes. Application for permanent authority denied, but temporary authority conditioned to expire Dec. 31, 1944, granted by reason of present emergency.

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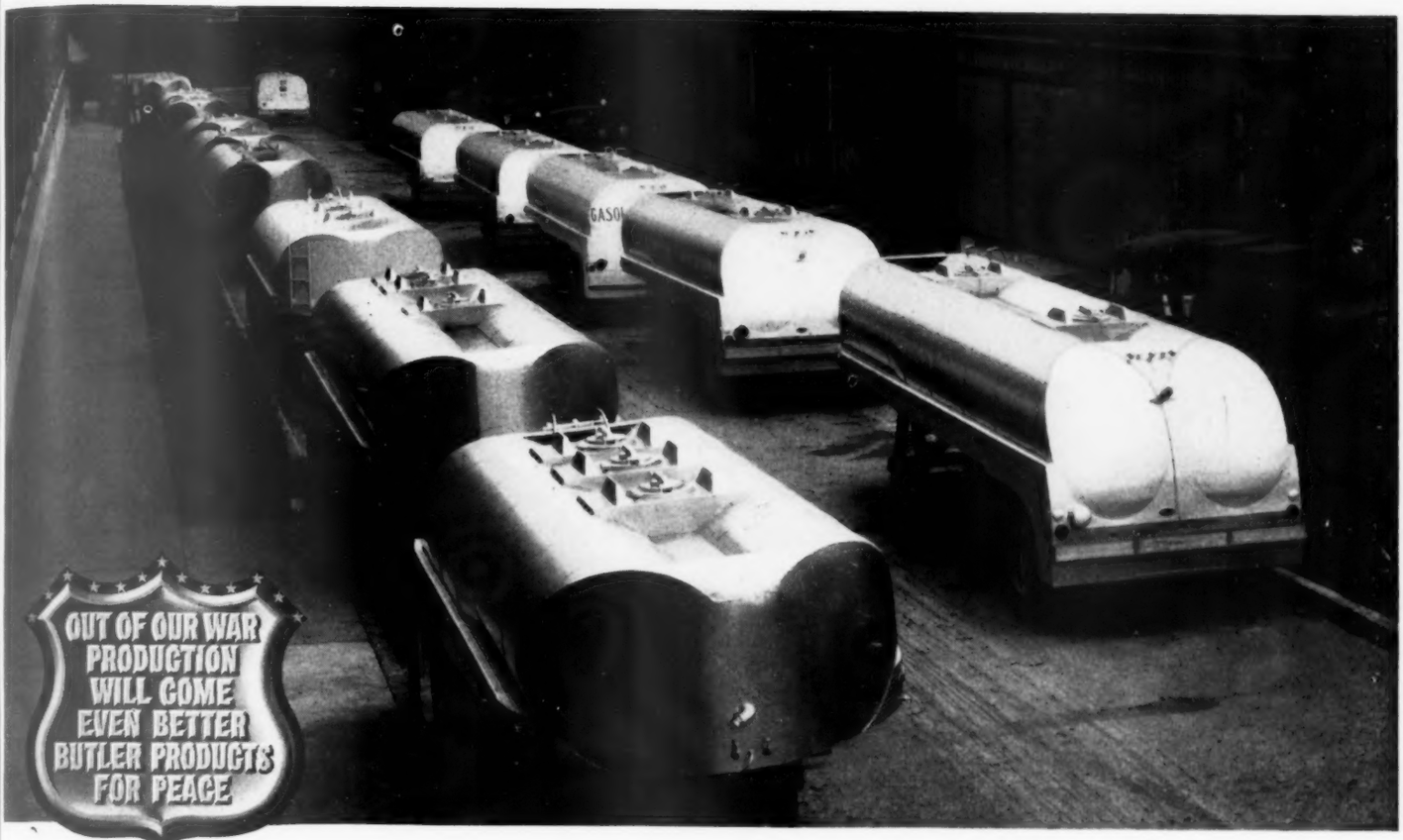

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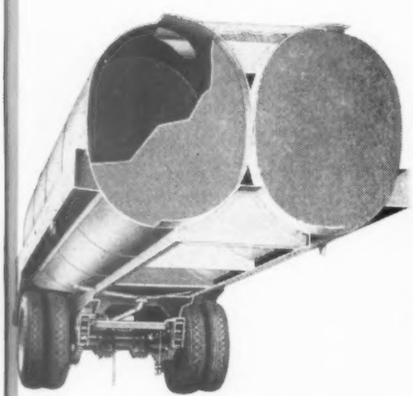

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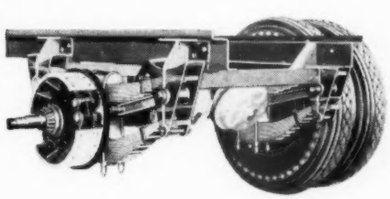

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Despite the fact that trainloads of Butler truck and trailer refueling units are going to war—we can still supply you with Butler Twin-Tank Safety Transports. A good stock of the 4,000 gallon sizes await delivery on presentation of your certificates of Transfer (PD 321 Forms) Twin-Tanks with one, two and three compartments are available. We suggest that you write, wire or telephone.

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☐ Send Butler Twin-Tank Safety Transport Book

☐ Send information on securing Certificate to buy Transport

☐ Send Truck Tank Book

Firm Name _____

By _____ Title _____

Address _____

City _____

State _____

—TANK *Safety* TRANSPORT

Two units of a hauling fleet are in for truck-saver lubrication and servicing. The government's U. S. Truck Conservation Corps program is causing drivers to "baby" their trucks these days

Truck Corps is Shot-in-Arm For Ration-Worried Dealers

SYRACUSE, N. Y. — A "christening" turned out to be a "harvest" when Gulf Oil Corp. launched its participation in the U. S. Truck Conservation Corps program here.

Thirty trucks came into the first "official station" for inspection the first day. A number were classified as "new business".

The writer, on a trip through the rationed area in the East, watched as new lifeblood for rationed stations rolled in.

Trucks coming in the first few days receive the expert attention of W. C. Ober, one of Gulf's engineers out of the New York office.

Gulf engineer Ober shows how a little tire care will keep 'em rolling

Engineer Ober is serving a twofold role in the program. He is instructing the company's sales personnel at selected stations so that they can do the same job at other official Truck Conservation Corps stations.

Analyzes Motors

He is also giving trucks automotive engineering service. With a portable motor analyzer, the compression, ignition, carburetor and fuel systems are checked and the owner given a report. Recommendations as to repairs are also given. Suggestions based on observation and the company's own charts are made regarding the cooling system and the units to be lubricated. These include the crankcase, transmission, rear axle, chassis, universal joints, water pump, steering gear and wheel bearings.

All this is part of the program to be carried on in stations having motor analyzing equipment. It is in addition to the company's "truck saver service" which was started about four months ago, and which is now the backbone of Gulf's plan of cooperation in the U. S. Truck Conservation Corps program.

Inspection Sheets Made

Gulf's entire program is built around a form, one side of which is an inspection sheet and the other a work sheet. Most oil companies have a similar form, but it is usually for passenger cars rather than trucks. The Gulf truck form is a simple adaptation of the company's passenger car program for which has been in use for a long time.

In getting the Truck Conservation Corps program under way, Gulf equipped "official stations" with the government's promotion material, including decals and extra copies of the truck owner's booklet. They also furnished a specially prepared sidewalk stand to fit their own sign frames.

Went After Business

But the real secret of getting the program going, and keeping it going, according to the executives who handled it in Syracuse, is to go out and get the business. For this particular opening, the company's salesmen, the agent and the company operators took a list of fleet owners, called on them, and sold them on the idea of sending their trucks to the station for a check-up.

The salesmen reported that it was the easiest selling job they had ever tried. They found that most of the prospects had read the government booklet on truck preventive maintenance and had seen other promotion material on the program.

Appointments convenient to the owners were made. This was to prevent congestion and to leave plenty of time to do the job right.

Once the truck came into the station, it went through the inspection routine, starting with the radiator and ending on the lift where the tires and the under parts could be gone over.

Typical Inspection

A good example of what happens in an inspection is the 1½ ton truck of the Smith Transportation Lines. Anyone looking casually at this truck would think it had been well cared for and was in perfect shape.

Yet the experts found that the spark plugs were in such shape that to continue using them would mean a big waste of gasoline. There was a small hole in the radiator hose which would have wasted antifreeze this winter. A tail light bulb was burnt out. The starter cable was just ready to give up the ghost and had to be replaced. A window that had been rolled down all summer was broken. The tires, while in fairly good shape, had to have some small breaks filled and other minor work. The battery was in poor condition and needed to be replaced before winter.

This one truck, No. 4 in a fleet, turned out to need this material for actual conservation:

Hose	$1.50
Plugs	3.90
Tail light	.20
Starter cable	$1.50
Tire repairs	$3.00 (est.)
Window Glass	$10.00 (est.)

All of this was in addition to regular services such as lubrication.

As the trucks rolled in for inspection and service, the local selling organization and the manager, S. B. Lingfitt, became more and more pleasantly surprised at the results. You could see a none-too-happy operator taking a new lease on life.

Gulf's own point of sale signs are used to supplement the government's

Business really picked up at this Gulf "official" U. S. Truck Conservation Corps station when the program got under way

Operators work out their 72-hour weekly limit for selling gasoline in many different ways. Some stay open 24 hours daily and sell gasoline during specified hours, giving parking and other services during off hours

Rationitis

Gasoline Rationing Brings New Problems: Oil Industry Hates It. Public Would Like to 'Beat' It

By NPN Staff Writer

A ZONE manager of a major oil company in Syracuse was beaming all over. His July loss on gasoline, compared with last year, was only 24%.

Conversely, his assistant in the outer office—a former field executive of the company now doing office work—was tearing his hair. He was trying to straighten out yesterday's gasoline ration records.

This was only one of many unusual things, compared with last year, that uninitiated oil marketers would have bumped into around the middle of August if they happened to be visiting in the East Coast area.

Perhaps the picture in the Finger Lakes and southern tier sections of New York, where the writer talked with oil men earlier this month, is typical of the entire gasoline rationing zone. That New York section is shaped like a dispensing can with a flexible spout. On the corners are Rochester, Binghamton, Syracuse and Elmira, with Buffalo at the spout's end.

Coupon Consternation

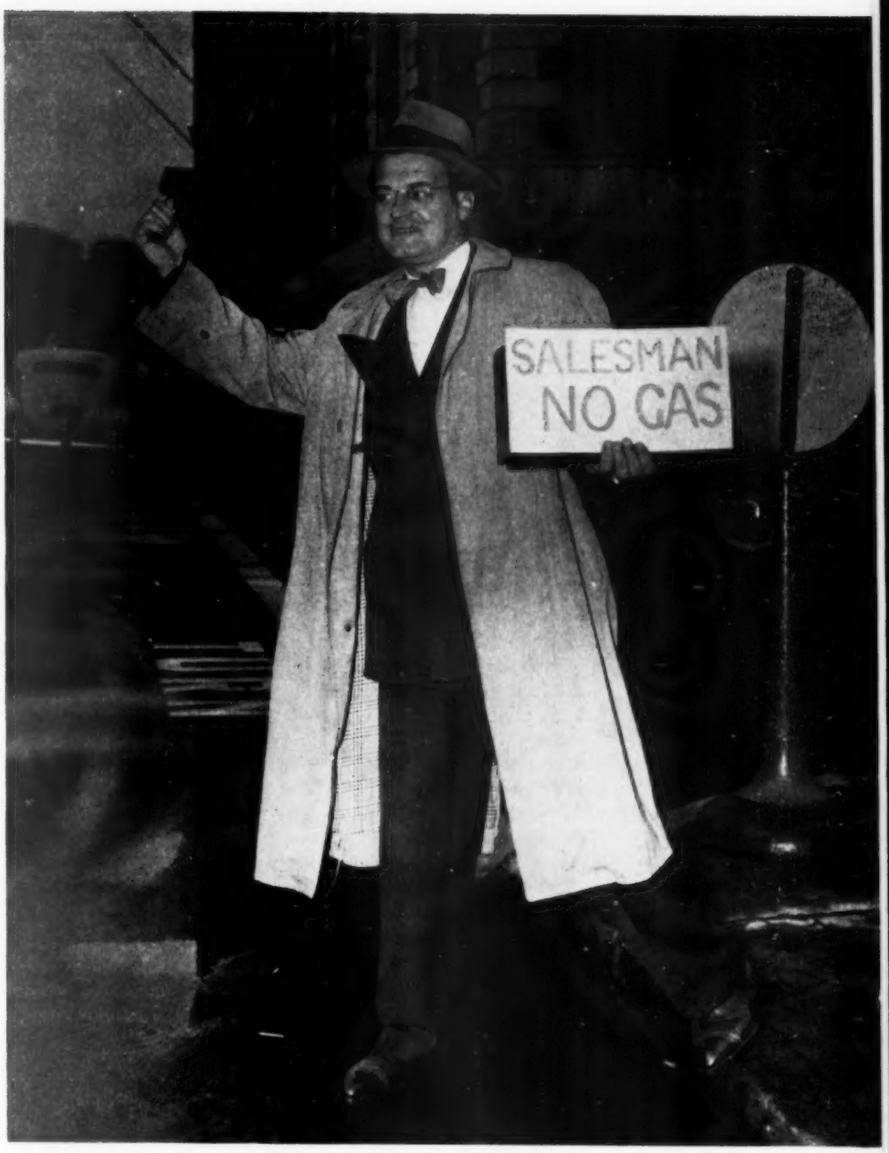
Talking to the former major company field executive, you learned that he was working on gasoline ration coupon sheets. Each sheet held 50 coupons which had been stuck on by dealers taking them in. There was a separate sheet for each of the 8 types of coupons.

The sheets were a mess. Some were stuck together. Most of them had an assortment of oily and greasy fingermarks. A few were pasted with a mixture of all types of coupons instead of only one type, as the regulations provide. Occasionally, they would include a coupon which will be no good until Sept. 22 or later. Coupons are numbered 1, 2, 3, 4, 5, and 6, each set of numbers being valid for a two-month period only. All improperly prepared sheets had to go back to the dealer to be straightened out before they could be turned in to the rationing board.

From the window of this oil man's office you could see many parking meters without customers. Yet the rate for 45 minutes' parking is only one penny. Revenues of parking meters have declined 12% in gasoline rationed areas against 5% in other areas, according to the Municipal Officers' Assn.

Leaving the oil company office, you ride down to the lobby in a girl-operated elevator. You see women taxi drivers "manning" the cabs and learn that they are making "big money" driving defense workers to and from their work, and that an ordinary rider was lucky even to get a taxi.

Ancient surries and buggies pulled by none-



This hitch-hiking salesman, Nelson N. Dennison of Syracuse, used to drive 1000 miles a week. He used up the 64 gal. in his "B" book in two weeks. "How can salesmen buy bonds and support the war if they can't make a living?" he asks

A sign of the times in the rationed zone. This is not a cut price; the operator found that quoting prices for whole ration booklet units got more business

Before rationing came to Rochester, which is only a few miles from the original rationed area, signs like this were common

too-frisky farm horses were parading around Syracuse's business section. These rigs bore placards dealing with the traveling salesmen's views of the gasoline situation. The stunt was sponsored by the Syracuse Traveling Men's Assn. This group is carrying on a campaign to obtain more gasoline for salesmen.

The president of that association, which numbers over 700 members, points out that there are 500,000 traveling men in the eastern rationed area who cover a total of 7,500,000,000 miles a year. At the rate of 15 miles per gal. according to his statistics, 500,000,000 gal. are used normally by salesmen each year, or about 100 gal. each. Association officers claim that their mileage has been reduced 80%, instead of 55% which they say is the government figure.

Seek 25,000 Signers

The 5000 salesmen in the Syracuse area are trying to get 25,000 names to send to President Roosevelt in protest against what they consider unjust treatment. Booths have been set up in hotels bearing the slogan: "Salesman's Relief. We don't want money—we need gas. Sign up here for your support."

Everybody in town seems to be trying to get into the Syracuse Rationing Board headquarters. According to Oscar F. Soule, administrator, nearly everyone has developed an Oliver Twist complex. They all want more. Officials at the rationing board said that people get pretty mad when they are not given all the gasoline they want.

Letters have come to the office from as far away as Ohio. The writers wanted to know how they could take fishing trips to Vermont and get gasoline when they got to Syracuse. They were told to apply to the nearest board in the region they reach where gasoline is rationed. There, board officials would determine their need for gasoline, and act accordingly.

Two southern boys applied at the board for a supplemental ration to get back home. The administrator did not question that the boys were from the South. The accent was genuine. But he asked the boys how he was to know whether or not they were going to use the gasoline to run around the state.

"I sure wouldn't try to fool you, suh. No suh, I wouldn't try to tell you wrong. We want this 'gas' to get home. I am not messing around with Uncle Sam. No suh, I'm not looking for any trouble like that".

The boys got the book.

The picture on the East is confusing. Practically every major company executive and independent operator believes that there is a lot of chiseling going on. There is much talk of a "black market".

One major oil company manager mentioned a specific case where one of his operators was approached by a gasoline bootlegger who offered to take care of the dealer. But he couldn't lay his hands on enough evidence to do anything about it.

See's a 'Brown Market'

Another level-headed and practical manager told this writer that there was, no doubt, a "brown market", for where there was so much smoke there was bound to be a little fire. But he couldn't prove anything. This executive even went so far as to call in one of his salesmen to tell his story as an indication of the fact that chiseling so far was 99% rumor and 1% fact.

This salesman said that nearly everyone was chiseling, to hear people talk, but he hadn't been able to catch anyone yet. He told of watching one station for over 2½ hours without getting anything specific.

Some of the ways that this man "thought" might be used to beat the rationing included:

Tank car shipments from the West.

Transport shipments from unrationed areas.

Falsification of original stocks on hand when rationing started.

Counterfeiting of coupons.

"S" card book holders bootlegging to restricted coupon book holders.

Whether or not any of these suspicions will develop into anything definite is yet to be seen. But everyone in the oil business in the East,

Not all closed stations are "dogs". This one, in the heart of an eastern city, was given up because the operator was unable to pay the high rent

from the last assistant helper to the top man is watching the other fellow.

Fear Price Wars

Many of the independent operators and most of the jobbers and major companies are fearful that a price war is coming when business hungry independent operators really start fighting to get coupons.

Both the major companies and the independents are doing everything possible to prevent this. Some of the independents seem to think that the major companies would like to see a battle royal on prices, so that when the smoke cleared away and the smaller independent operators were out of business, the majors would be running the show.

But the major company managers are putting in as long hours as the independents, trying to avoid the fight over prices. Their reasoning is that the future might be worse than it is now. They are not craving an expensive price war now to put them in better position later.

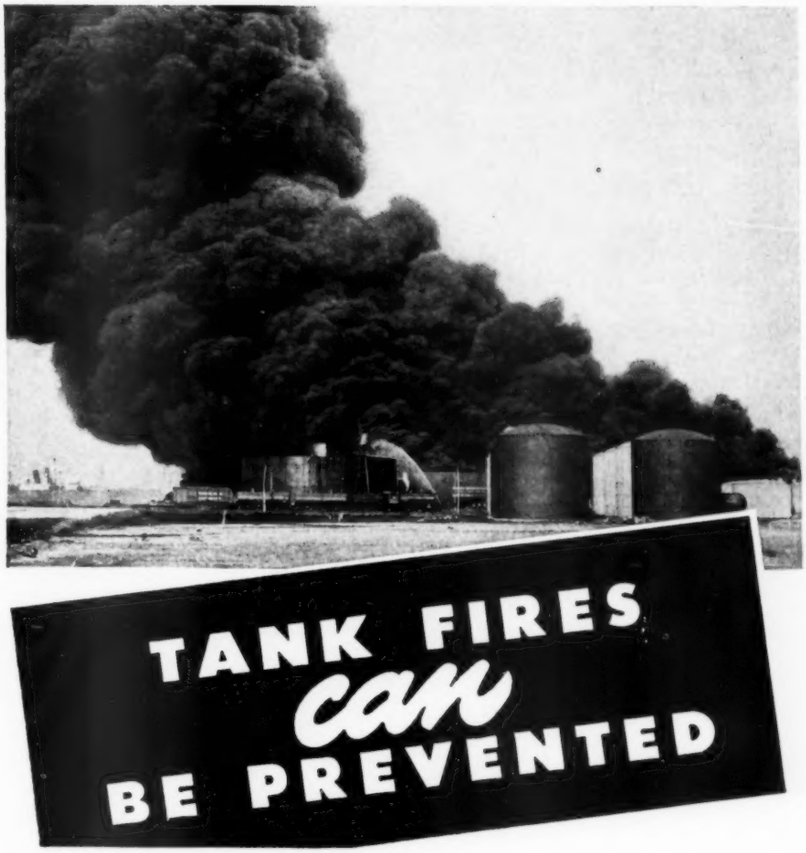
In Rochester, rationing started Aug. 22. But up to the last minute, nearly, there was one optimistic oil man there taking bets that it wouldn't come. Rochester had been operating in the "buffer zone", and what was happening there during the period preceding "permanent" rationing might be a preview of what will go on in other places if rationing is extended.

"Gas" Hoarding Widespread

L. J. Cleary, independent jobber in Rochester, is in the same boat as most oil men in that part of the country. Mr. Cleary said that at that particular time his biggest worry was taking care of his customers. It looked to him as though everyone in Rochester was trying to store up gasoline against the time when coupon rationing came. He cited one man who, he said, had a measly little 100 gal. of gasoline stored in the basement of his $21,000 home in 5-gal. cans. Mr. Cleary was limiting the purchase of gasoline at his company's stations to 5 gal. per customer, put in the car only. A check around some of Rochester's hardware stores for cans usually found the supply exhausted.

Former "out of gas" signs at service stations

Some eastern dealers stay open only during the 72 hours a week in which they are permitted to sell gasoline and do not keep open for servicing after the allotted time has passed



• With the very rare exception of fires originating inside the tank—a tight tank is safe against fire if it is properly equipped with an Oceco Flame Arrestor. A flame arrestor, naturally, can not protect a tank that has been broken open with a direct bomb hit or other cause—but, flame arrestors will keep the resulting fire from spreading to other tanks which have not been broken open.

Oceco Flame Arrestors are approved by Underwriters Laboratories, Inc. They are protecting more than 350,000,000 bbls. of tankage (about 4 times the average total gasoline stocks in this country)—and have a perfect fire record.

No tight tank equipped to Oceco specification — even though located in the middle of a blazing tank farm — has ever been lost by fire.

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Our recently completed catalog V-50 gives complete details of Oceco Flame Arrestors, Vent Valves, etc. . . . Send for a copy!

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THE JOHNSTON & JENNINGS COMPANY

883 Addison Road · Cleveland, Ohio

Engineering and Sales Representatives in the Principal Cities

FIRE PREVENTION AND VAPOR CONSERVATION EQUIPMENT
FOR VOLATILE LIQUID STORAGE TANKS

were supplemented with signs reading:

Gas Rationing Ahead

Fill Up Here

Open

Many of the stations were doing a big business in 5-gal. oil cans painted red. One station had a bunch of red cans—just ordinary looking 5-gal. cans—with a price of $2.10 each.

Cans Sell Fast

A chain of auto supply stores had an assorted stock of 2 and 5-gal. cans. The manager said over 600 had been sold in the past week.

One of this company's good sellers was a flat 5-gal. heavy gauge can bearing the Quartermasters Corps, U. S. Army, print. These cans sold for $3.95, with a special built-in spout for 79c extra. They were rather elaborate cans with a built-in vent to keep air circulating. Several hundred had been sold, the manager said, some customers buying 4 or 5. How this store got these cans, the writer was told, was none of his business.

One oil executive told of attending a country auction where an old 55-gal. drum was bid up to $4.50, while a dining room set went for around $3. Many coupes carry these drums in the back, connected up with the tank as an auxiliary. Until the supply was exhausted, mechanics were doing a land office business attaching 20 gal. auxiliary tanks at $16 each.

Housekeeping Slips

Rochester visitors would have found few stations closed before the advent of rationing: about 25, most of them "dog stations". Few girls are found operating stations as yet, though there are a sprinkling of "gas widow" operators—wives who take over while their husbands are in the armed forces. There is little let-down in service, but the restrooms are generally clean.

A shake of the head and a worried expression answers the question as to what the fuel oil situation is going to be this winter. "It looks bad" and "our stocks are low" are about the only answers received to the question.

There is plenty of coal. One large coal and coke company is giving away all kinds of premiums—tea kettles, blankets and the like—on a coupon deal. But few conversions have been made from oil to coal.

A swing around the Southern Tier of New York state to Binghamton, which some residents call "Bingo" for short, brings the visitor to a rather hard hit gasoline marketing town, but there is not much evidence of any one there in the oil business throwing in the sponge. The town is hard hit because there are a lot of defense industries, and the draft boards seem to be making a clean sweep of all the men.

Complainer Hears Story

One of these men is G. L. Savory, who has built up one of the largest independent companies in that part of the state. Mr. Savory, who has a wife and a child, expects to be called around the first of the year. He is in his early thirties. When this writer arrived at Mr. Savory's bulk plant, the jobber was in a conversation with some one who was evidently protesting against the amount of gasoline he could get on his particular kind of card. Mr. Savory told him that there were a lot of folks he knew of who had given up $80 a week jobs and were off at some army camp or foreign country, working for $50 a month. When he ended his conversation, the man at the other end of the line certainly had no doubt that he had applied to the wrong place for sympathy.

Frank Zuber, Norwich, N. Y., one of New York's largest independent oil jobbers. NPN found Mr. Zuber at his newly-acquired farm, dressed in overalls, and worrying very little about his 2,000,000 a month gallonage

These 5-gal heavy gauge Quartermaster Corps cans sold like hot cakes in Rochester just before rationing started. The price was $3.95, plus 79c for special spout

Mr. Savory's office force has gone down from 8 to 2. His gallonage is sadly down too, but no more than most of the other companies, who will freely tell you how much it is off but don't want it published. He finds it hard to get competent help. His fuel oil stocks are down, even for the rather small storage he has.

But this fighting jobber is getting his share of the business. He is working with his operators to keep up their morale. He found time, and had the ability, to collect one of the state's highest ratios of rubber in the recent drive, of which he was chairman in his county. He has no one to turn the business over to, but is working out plans so that it will be there when he comes home from the army.

Is this jobber down in the mouth?

He is not. His view of the future for the independent oil jobber after the war is roughly the same as the views contained in Editor Platt's book by that name. He sees even a brighter future than Mr. Platt pictured.

Station operators in Binghamton, both independents and major company operators, seem to have this same fighting spirit. They are selling a lot of funny gadgets for a service station: bird cages, bay rum, rugs, stepladders, toy boats and teakettles, poker chips and minnow buckets.

Clings to Stations

One such operator is Gordon W. Driscoll, who operates two stations under the name of Gordon's Service. He has been in the business for 6 years and is a typical, well-trained service station man. He had ambitions of eventually branching out into the bulk plant business, but now he, too, expects to be called into the service. Last year his net income, he says, was quite comfortable. This year, he thinks he will be lucky if it comes to a thousand dollars. Most of this decline is due to falling off of business at one of the stations that formerly had mostly tourist trade.

But this operator says he is going to keep his stations if he has to mortgage his home. He wants to hang on to them as long as there is enough left to keep his wife going while he is in the army. She has never worked, but is considering it. Mr. Driscoll sees a greater era after the war for those service station operators who have managed to stick it out than there has ever been.

"It's a natural, and those fellows who by hook or crook can stay with it until after the war are going to have a real gravy train", he says.

Duplication of this operator's attitude and of the major oil company's optimism can be found in nearly every quarter of the gasoline rationed area, whether they are in the big city or the smaller town.

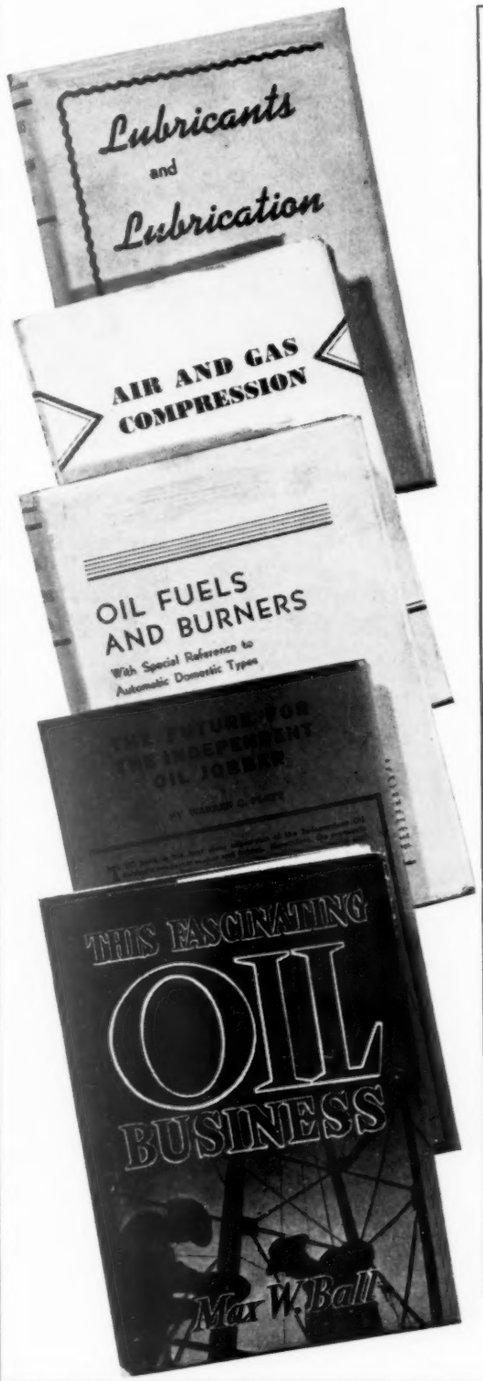
Successful Jobber's Views

The attitude of a big jobber in a smaller town can be had by taking a 40-mile trip through the dairy region south of Binghamton to Norwich, N. Y. That is the headquarters of the Z. and M. Independent Oil Co., run by Frank Zuber. Norwich is a town of about 8000 where everything is clean and peaceful. Everyone there knows Mr. Zuber. In fact it seems as though most of the residents are working for him.

For in addition to being an oil man—one of the largest independent companies anywhere, formerly running around 2,000,000 gal.

Build Your Library of Oil Knowledge and Facts with these

Books for Oil Men--



NPN Recommends:

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Air and Gas Compression—With 60 pages of alignment charts, equations, tables, for computing pressure drop in pipelines. Other compression data, etc..... $3.00

Oil Fuels and Burners—Covers automatic domestic types of burners. Includes fuels, layout of systems, trouble charts, heating requirements, etc..... $4.00

The Future for the Independent Oil Jobber—By Warren C. Platt. Proves economic worth of Oil Jobbers and shows what future in distribution holds..... $2.00

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a month—Mr. Zuber is mayor of the town, and president of a bank. He runs a nationally known fishline factory, a vault refrigeration business and several other enterprises. Just now. Mr. Zuber is getting into farming. The writer went out to Mr. Zuber's new farm. He has just taken it over, and is modernizing the 200 acres by enlarging a dairy that was already there, and is getting ready to raise beef cattle on an extensive scale.

'Back to Overalls'

Mr. Zuber was in an old pair of overalls, and had just finished an interview with one of his dealers who had tracked him down to the farm.

"I am not worrying about the rationing situation," said Mr. Zuber. "In fact I am not worrying much about anything. I started the business in 1916 and have been successful up to now. I found out long ago that worrying never helped things a bit. Perhaps if more oil men will put these on"—he pointed to his overalls—"things will work out all right. From now until after the war is over, I will have to work the way I did in the years when I was getting going. Certainly things don't look good. One of my best stations"—he has 50 company stations—"is down from 7 men to 2 men. The operator of another of my good stations recently went to the navy, and his partner is getting ready to go. My supervisors are disappearing; salesmen are passing out of the picture for defense. That is as it should be. It is up to oil men to work out the problem of keeping going. And they will do it—they always have."

That was the gist of the conversation of this remarkably successful jobber, operating 8 bulk plants all in the rationed area.

Small Town Hit

Coming toward Buffalo in the rationed area, the visitor might run into the town of Hornell. This is a railroad town. One operator there at the nadir of discouragement said they would build a fence around the town if the war continued. Only a few old men and "rejectees" were left there; and these men worked 6 days a week, had little time for driving, and were too tired to drive anyway. Parked around the town were a good many cars, all carrying "A" stickers.

Farther down the road was another operator who said he did 99,000 gal. last year; would be lucky if he hit 40,000 this year. At Mt. Morris, Joe DeVantio, who retired from the service station business to sell eats and sandwiches to the boys, said that the operators of the town's 14 service stations were "starving", but that none had closed as yet.

Thus went the story on a roaming 3-day trip. The major companies don't like rationing; the jobbers hate it; the dealers despise it; and 99% of the people on the street look on it the way they did on prohibition, and would beat it any way they could. Many tell you they would do less driving under a voluntary system, if rationing is necessary. Now they think they are being hamstrung with unfair restriction.

The marketer sending a postcard home could truthfully say: "Things are tough here, and don't seem to be improving."

SEMI-ANNUAL REPORTS

Union Oil Co. of Calif.

Union Oil Co. of Calif. reported a net profit of $2,859,769 for the first half of 1942 as compared with $3,175,895 during the same period of 1941. Although total sales for the six months increased 11% over the same period of 1941, earnings did not show a similar gain because of increased operating expenses due to the war.

° ° °

Standard Oil Co. of Calif.

Consolidated net profit of Standard Oil Co. of Calif. was estimated at $13,324,036.11 for the first six months of 1942. This is an increase of $553,969.36 over the $12,770,066.75 net profit for the same period last year. This does not include the company's 50% interest in The Bahrein Petroleum Co. Ltd. and California Arabian Standard Oil Co.

° ° °

Panhandle Producing & Refining Co.

Panhandle Producing & Refining Co. and subsidiaries' 1942 first-half report shows a net profit of $48,316.03 after taxes have been deducted, as compared with $89,833.67 for the first six months of 1941.

° ° °

Consolidated Oil Corp.

Consolidated Oil Corp. and subsidiary companies reported a net income of $8,423,448.22 for the first six months of 1942. This compares with $3,471,941.15 for the same period in 1941.

° ° °

Mid-Continent Petroleum Corp.

After providing a reserve of $1,735,480.04 for estimated federal and state income taxes, Mid-Continent Petroleum Corp. and subsidiaries report a net income of $2,967,851.15 for the first six months of 1942. This is an increase of $1,209,503.31 over the first six months of 1941.

° ° °

Ohio Oil Co.

The Ohio Oil Company and subsidiaries report a net profit to surplus of $5,843,194.45 for the first six months of 1942 as compared with consolidated net income to surplus of $4,776,815.06 for the same period last year.

° ° °

Honolulu Oil Corp.

Earnings of the Honolulu Oil Corp and subsidiaries for the first-half of 1942 are reported as $770,475.07, an increase of $209,069.43 over the first six months of 1941.

° ° °

Standard Oil Co. of Indiana

Consolidated net earnings of Standard Oil Co. of Indiana for the first half of 1942 totaled $19,390,526 as compared with $21,763,134 for the same period of 1941. This was after providing $15,516,358 for federal income and excess profits taxes.

Socony-Vacuum Oil Co.

Consolidated earnings for first half of 1942 are estimated at approximately $13,500,000, company reports. This includes full equity in six months' earnings of Standard-Vacuum Oil Co., in which Socony has a 50% interest; and after allowance for a 45% income tax rate against 1942 earnings. Earnings for the first half of 1941, as finally adjusted from preliminary estimates, were $13,000,000.

° ° °

Barnsdall Oil Co.

Barnsdall Oil Co. net profit for the first half of 1942 was $1,208,754.13, company reports. This compares with $1,310,105.33 for 1941. This was a decrease of $101,351.20 as compared with 1941.

° ° °

Standard Oil Co. (Ohio)

Standard Oil Co. of Ohio reported a net profit after all deductions, of $2,089,315.62 for the first half of 1942 as contrasted with $2,542,311.81 the first half of 1941.

Gross operating income for the first half of 1942, after deduction of gasoline and oil taxes, was $64,067,084.50 as contrasted with $44,776,538.44 for the same period in 1941.

° ° °

National Refining Co.

National Refining Co. first-half report shows an operating profit of $1,157,791 for the first half of 1942. After provisions for taxes and contingencies, the net profit was $462,791. Gasoline gallonage for the first half of 1942 shows an increase of about 7% over the same period of 1941. The report states that earnings for the last six months of 1942 may be considerably less than for the first half.

Ickes Underestimates His Tire Life

Esso Marketers are betting their customers 16 to 1 that tires have more miles left than the drivers realize. Esso dealers are equipped to estimate the mileage left in tires by using a tread depth gauge and a calculator. Tread depth of each tire is measured in terms of 1/32 of an inch, then translated into mileage. The Esso method was tried out by Coordinator Ickes (left). It took 5 minutes and showed that he had underestimated by 10,000 miles the life left in his tires

COMING MEETINGS

SEPTEMBER

Oil Trades Assn. of New York, Sports Day, Pelham Country Club, Pelham Manor, N. Y., Tues., Sept. 8.
National Assn. of Assessing Officers, 9th Annual Conference, Cosmopolitan Hotel, Denver, Colo., Wed.-Sat., Sept. 9-12.
Detroit Oil Men's Club, Fall Golf Tournament, Birmingham Golf Club, Detroit, Mich., Fri., Sept. 11.
Chicago Oil Men's Club, Fall Golf Party, Brookwood Country Club, Chicago, Ill., Thurs., Sept. 17.
National Petroleum Assn., Annual Meeting, William Penn Hotel, Pittsburgh, Pa., Thurs.-Fri., Sept. 17-18.
New Jersey Oil Trade Assn., Fall Golf Outing and Dinner, Suburban Golf Club, Elizabeth, N. J., Thurs., Sept. 24.
American Gas Assn., San Francisco, Calif., Mon.-Wed., Sept. 28-30.
New England Tax Conference, Hotel Biltmore, Providence, R. I., Wed.-Thurs., Sept. 30-Oct. 1.

OCTOBER

American Institute of Mining & Metallurgical Engineers, Regional Meeting, St. Louis, Mo., Fri., Oct. 2.
American Gas Assn., Annual Meeting, LaSalle Hotel, Chicago, Ill., Mon.-Tues., Oct. 5-6.
29th National Foreign Trade Convention, Hotel Statler, Boston, Mass., Wed.-Fri., Oct. 7-9.
Texas Mid-Continent Oil & Gas Assn., 23rd Annual Meeting, Dallas, Tex., Thurs.-Sat., Oct. 8-10.
Western Petroleum Refiners Assn., Allis Hotel, Wichita Kans., Fri., Oct. 9.
American Society of Mechanical Engineers, Fall Meeting, Rochester, N. Y., Mon.-Wed., Oct. 12-14.
American Institute of Mining & Metallurgical Engineers, Petroleum Division, Los Angeles, Calif., Mon.-Sat., Oct. 12-17.
Indiana Independent Petroleum Assn., Hotel Severin, Indianapolis, Ind., Wed.-Thurs., Oct. 14-15.
National Stripper Well Assn., Annual Meeting, Wichita, Kans., Mon., Oct. 19.
National Tax Conference, Netherlands Plaza Hotel, Cincinnati, Ohio. Mon.-Thurs., Oct. 19-22.
Ohio Petroleum Marketers Assn., Annual Convention and Marketing Exposition, Hotel Deshler-Wallick, Columbus, Ohio. Wed.-Thurs., Oct. 20-21.
Independent Petroleum Assn. of America, 13th Annual Meeting, Lassen Hotel, Wichita, Kans., Mon.-Wed., Oct. 19-21.
Society of Automotive Engineers, Midwest Fuels & Lubricants Regional Meeting, Tulsa, Okla., Thurs.-Fri., Oct. 22-23.
National Lubricating Grease Institute, 10th Annual Meeting, New Orleans, La., Sun.-Thurs., Oct. 25-29.
Oil Trades Assn. of New York, Annual Banquet, Waldorf-Astoria Hotel, New York, N. Y., Tues., Oct. 27.
31st National Safety Congress and Exposition, Sherman Hotel, Chicago, Ill., Tues.-Thurs., Oct. 27-29.
American Institute of Mining & Metallurgical Engineers, Petroleum Division, Austin, Tex., Thurs.-Sat., Oct. 29-31.
Western Petroleum Refiners Assn., Washington-Youree Hotel, Shreveport, La., Fri., Oct. 30.

NOVEMBER

American Assn. of Petroleum Geologists, Los Angeles, Calif., Thurs.-Fri., Nov. 5-6.
California Natural Gasoline Assn., Los Angeles, Calif., Fri., Nov. 6.
American Petroleum Institute, 23rd Annual Meeting, Palmer House, Chicago, Ill., Mon.-Fri., Nov. 9-13.
American Institute of Chemical Engineers, 35th Annual Meeting, Netherlands Plaza, Cincinnati, O., Mon.-Wed., Nov. 16-18.
American Chemical Society, National Chemical Exposition and National Industrial Chemical Conference, Sherman Hotel, Chicago, Ill., Tues.-Sat., Nov. 17-21.
American Society of Mechanical Engineers, Annual Meeting, New York, N. Y., Mon.-Fri., Nov. 30-Dec. 4.
15th National Exposition of Power and Mechanical Engineering, Central Palace, N. Y., Mon.-Sat., Nov. 60-Dec. 5.

DECEMBER

New Jersey Oil Trade Assn., Annual Banquet & Election of Officers, Robert Treat Hotel, Newark, N. J., Thurs., Dec. 3.

JANUARY, 1943

North Carolina Oil Jobbers Assn., Hotel Carolina, Raleigh, N. C., Wed., Jan. 20.

FEBRUARY

American Institute of Mining & Metallurgical Engineers, Annual Meeting, New York, N. Y., Mon.-Thurs., Feb. 15-18.
Iowa Independent Oil Jobbers' Assn., Hotel Fort Des Moines, Des Moines, Ia., Wed.-Fri., Feb. 24-26.

APRIL

American Petroleum Institute, Division of Production, Eastern District, Wm. Penn Hotel, Pittsburgh, Pa., April 8-9.

MAY

Petroleum Industry Electrical Assn., Houston, Tex., Wed.-Thurs., May 5-6.

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You can reduce to a minimum the time needed for handling your bulk liquids in transit, by shipping via General American Terminals. For at these strategically located storage plants, speed is a fetish. It's speed with safety, too—the most modern precautions against leakage, contamination, evaporation, fire. And it's speed with economy — General American Service saves you money in many ways. Cut costs and schedules. Investigate!

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3. *INDEPENDENT OWNERSHIP.* Strictest privacy. We do not buy, sell or refine any oils.
4. *NO WHARFAGE.* There is no wharfage charge at our own private docks.
5. *SPEED WITH SAFETY.* Day and night crews, complete facilities, eliminate all shipping delays.
6. *LARGE TANK CAR FLEET.* Now working night and day, delivering essentials of war.
7. *NO CONTAMINATION.* Separate pumps, lines, storage zones for dissimilar commodities.

GATX GENERAL AMERICAN

GENERAL AMERICAN TANK STORAGE TERMINALS

GOODHOPE and WESTWEGO, LA. (Port of New Orleans)
CARTERET, NEW JERSEY (Port of New York)
CORPUS CHRISTI, TEXAS GALENA PARK, TEXAS (Port of Houston)

A DIVISION OF GENERAL AMERICAN TRANSPORTATION CORP.

NPN's *Washington Directory* of Oil Agency Headquarters

Following is a partial list and directory of governmental agencies in Washington dealing with matters affecting the oil industry: (List is as accurate as possible but is only tentative as room and phone numbers are constantly changing.)

Abbreviations code: Rm for room; Ex for phone extension.

Office of Petroleum Co-ordinator

Interior Department (New Building) 18th and C. Sts., N. W., Phone REpublic 1820.

Receptionist
Mrs. Rosalie E. Reid, Rm 6635, Ex 3429-4820.

Co-ordinator
Harold L. Ickes, Rm 6156, Ex 5000.

Deputy Co-ordinator
Ralph K. Davies, Rm 6654, Ex 3331.

Assistant Deputy Co-ordinators
Robert E. Allen, Rm 6647, Ex 4401.
Everett Lee De Golyer, Rm 7516, Ex 4459.
Bruce Brown, Rm 6644, Ex 2066.

Special Assistants
Dr. John W. Frey, Rm 4345, Ex 4272.
Howard T. Mather, Rm 6626, Ex 4626.
J. Elmer Thomas, Rm 7442, Ex 4735.
Elmer E. Batzell, priorities allocation, Rm 6070, Ex 2181.

Executive Officer
Stanley W. Crosthwait, Rm 6415, Ex 4363.

WPB Priority Consultant
Robert B. Shirk, chief priority specialist, Rm 7340-42, Ex 4616-17.

Information Division
Gordon Sessions, director, Rm 7515, Ex 4446.
Herbert A. Yocom, assistant director, Rm 7515, Ex 3844, 4650-3844.

Facility Security Division
W. D. Mason, director, Rm 3641, Ex 4172.

Foreign Division
James T. Duce, Rm 4442-40, Ex 4417-4863.
Wm. D. Crampton, associate director, Rm 4448, Ex 4788.
C. S. Snodgrass, associate director, Rm 4450, Ex 2968.
Walter R. Lange, tanker co-ordinating expert, Tanker Co-ordinating Board, Rm 7512, Ex 4744-4437.

Legal Division
J. Howard Marshall, chief counsel, Rm 6649, Ex 4100.
Robert E. Friedman, associate chief counsel, Rm 6424, Ex 668.
David M. Hudson, associate chief counsel, Rm 6422, Ex 793.
George A. Wilson, principal attorney, Rm 6642, Ex 4898.

Marketing Division
Robert T. Collier, director, Rm 4257, Ex 4646-7.
Paul A. Best, assistant director, Rm 4258, Ex 3518.
Joseph H. Ellender, principal marketing analyst, Rm 4256, Ex 4434.
D. C. Arnold, chief of asphalt section, Rm 4244, Ex 2787
Ned F. Foulds, chief of fuel oils section, Rm 4257, Ex 4797.
Howard C. Cooper, chief of lube oils and miscellaneous products, Rm 4247, Ex 4313.

Materials Division
Greer W. Orton, director, Rm 7314, Ex 4585.

Natural Gas and Natural Gasoline Division
E. Holley Poe, director, Rm 7423, Ex 4860.
Paul M. Raigorodsky, assistant director, Rm 7423, Ex 4774-2059.
James E. Pew, chief of natural gasoline section, Rm 7424, Ex 4871.
Charles E. Webber, natural gasoline section, Rm 7424, Ex 4871.
Robert W. Ducker, chief of natural gas section, Rm 7426, Ex 2524.
Thomas R. Weymouth, consultant, natural gas section, Rm 7426, Ex 2524.

Petroleum Supply Division
Robert Lee Minckler, director, Rm 7452, Ex 4834.
R. C. Sauer, assistant director, Rm 7450, Ex 2083.

Production Division
Donald R. Knowlton, Rm 7410, Ex 4861.
Ralph J. Schilthuis, assistant director, Rm 7410, Ex 2907-4689.

Refining Division
Phillip M. Robinson, acting director, Rm 6642, Ex 4786-87.
Robert B. Cragin, assistant director, Rm 3218, Ex 3237.
Douglas P. Bailey, chief of operations section, Rm 3213, Ex 4877.
Max B. Miller, chief equipment procurement section, Rm 7443, Ex 4560.
George Parkhurst, chief of facilities section, Rm 3229, Ex 3941-3232.

Research Division
Edward B. Swanson, director, Rm 7315, Ex 649.
Oliver S. Ambrose, assistant director, Rm 7317, Ex 4777.

Division of Reserves
Wm. B. Heroy, director, Rm 7516, Ex 4459.

Transportation Division
Maj. J. R. Parten, director, Rm 6629, Ex 4418-3329.
W. E. Kinsolving, associate director, Rm 6629, Ex 3557.
Lee R. Cowles, assistant director, Rm 6620, Ex 3658.
Donald A. Sears, chief of pipeline section, Rm 6624, Ex 4833.
Boyd Wilson, chief of rail transportation section, Rm 6623, Ex 4620.
S. D. Archbold, chief of inland waterways section, Rm 6622, Ex 4333.
Arch Turner, chief of motor transportation section, Rm 6619, Ex 4300.

Liaison
Gen. Walter B. Pyron
Liaison agent between Army Department and OPC, Phone RE 6700, Ex 6044. Rm 3062, Munitions Bldg., Constitution Ave. between 19th and 21st Sts.

War Production Board

Petroleum Machinery section, Special Industry Machinery Branch—Temporary Bldg. E. 5th Wing—Third Floor. Phone REpublic 7500, Ex 3441.
A. E. Collins, chief, Ex 5741.
John W. Choates, refinery equipment, Ex 72615.
William L. Clark, production machinery, Ex 72615.
E. B. Miller, production and refining equipment, Ex 5751.
M. A. Willner, production and transportation, Ex 72615.

Oil Section—New Social Security Bldg., Rm 4613, Phone REpublic 7500.
Dr. Walter Whitman, petroleum consultant, Rm 3082, Railroad Retirement Bldg., 4th & C St., S. W., Ex 6310.
C. C. Monrad, assistant, Rm 3090 Railroad Retirement Bldg., 4th & C St., SW., Ex 2983.

Rubber Co-ordinator
Arthur B. Newhall, Rm 2300, Ex 4698.

Liaison, WPB-OPC-RFC
R. Otis McClintock, Rm 5193 A, Ex 71181.

Office of Price Administration

Temporary D Bldg., 4th and Independence Ave., Phone REpublic 7500.
Leon Henderson, administrator, Rm 46, Ex 5586.
Dr. J. K. Galbraith, staff deputy administrator, Rm 5131-B (Census Bldg., 2nd & D St., S. W.), Ex 5203.
Dr. George W. Stocking, assistant administrator, fuel division, Rm 245, Ex 72519.
Page Keeton, chief counsel, fuel division, Rm 1604, Ex 6359.
Michael Soel, administrative officer petroleum section, Rm 236, Ex 5389.
George Doffing, price executive of petroleum section, Rm 236, Ex 5388.
Joseph H. Salmon, associate price executive, Rm 2530, Ex 6376.
Robert Collacott, head of refined products unit, Rm 2705, Ex 6636.
Edward W. Doherty, chief, economic analysis unit, Rm 2721, Ex 6370.
Peter Jensen, business specialist on lubes, fuel oils, asphalt, Rm 2709, Ex 4916.
Leo Van Herpe, chief of fuel section accounting division, Rm 2215, Ex 5539.
Watson B. Joyes, consultant in crude oil unit, Rm 2717, Ex 4403.
Joel Dean, handling gasoline rationing plans, Rm 254, Ex 73411.

U. S. Tariff Commission

7th and F st., N. W., Phone NAtional 3947.
Petroleum Accounting Section
Kenneth L. Stone, chief, Rm 155, Ex 123.

Office of Defense Transportation

Interstate Commerce Commission Bldg., Constitution Ave., & 78th St., N. W. Phone REpublic 7500.
Joseph B. Eastman, director, Rm 5136, Ex 3527.
Fayette B. Dow, assistant on pipelines, tank cars, tankers and trucks, Rm 5132, Ex 73207.
J. G. Scott, counsel, Rm 5418, Ex 2460.

Motor Transport Division
John L. Rogers, director, Rm 4211, Ex 2297.
Sam F. Niness, chief of petroleum carrier section, Rm 4221, Labor Bldg., Ex 6351.
V. T. Cumming, chief of vehicle maintenance section, Rm 4215, Labor Bldg., Ex 72731.
T. L. Preble, consultant, vehicle maintenance section, Rm 4215, Labor Bldg., Ex 72775.
R. D. Thomas, chief of tire maintenance section, Rm 4209, Labor Bldg., Ex 71446.
H. H. Kelly, chief of allocation and materials section, Rm 4311 (Labor), Ex 73027.
Leon F. Banigan, assistant to Kelly, Rm 4311, Labor Bldg., Ex 73027.

Congress

Congressional Oil Investigating Committee
Rep. Wm. J. Cole Jr., chairman, New House Office Bldg., Rm 1535, Ex 699.

Senate Oil Shortage Investigating Committee
Sen. Francis Maloney, chairman, Senate Office Bldg., Room 354, Ex 1196. Phone NAtional 3120.

Petroleum Industry War Council

William R. Boyd, Jr., chairman, Rm 919, Commonwealth Bldg., 1625 K St., N.W. Phone DIstrict 2820. Allan H. Hand, secretary-treasurer.

U. S. Maritime Commission

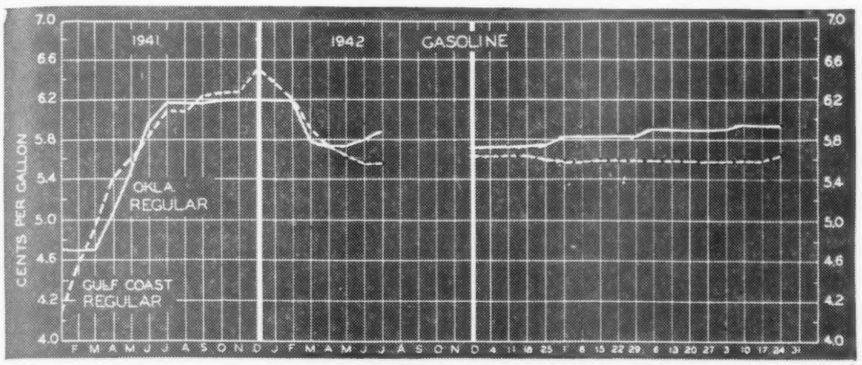
Commerce Department, Phone REpublic 6620.
B. B. Jennings, director of tanker operations, War Shipping Administration. Rm 4309, Ex 87, 88, 89.

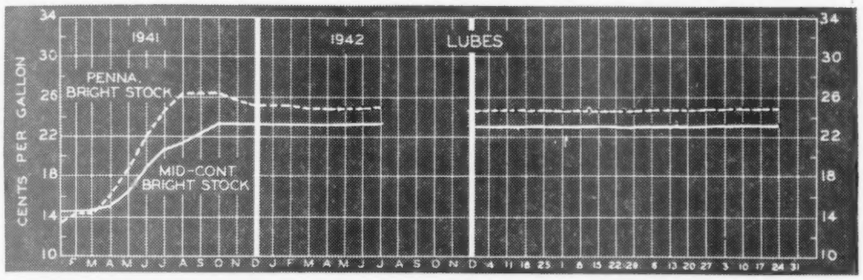
OIL IS AMMUNITION — USE IT WISELY !

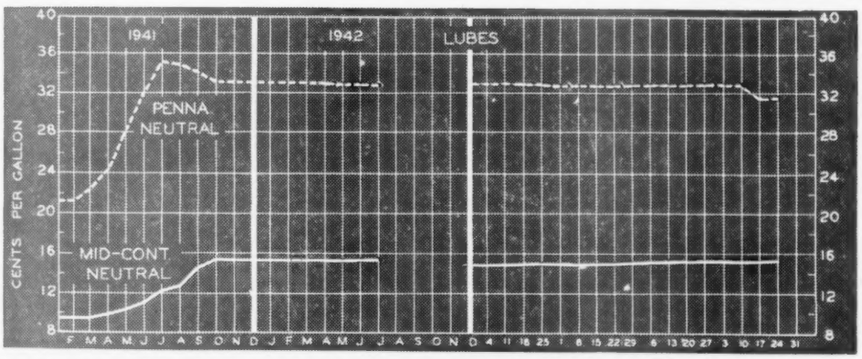
STATISTICS

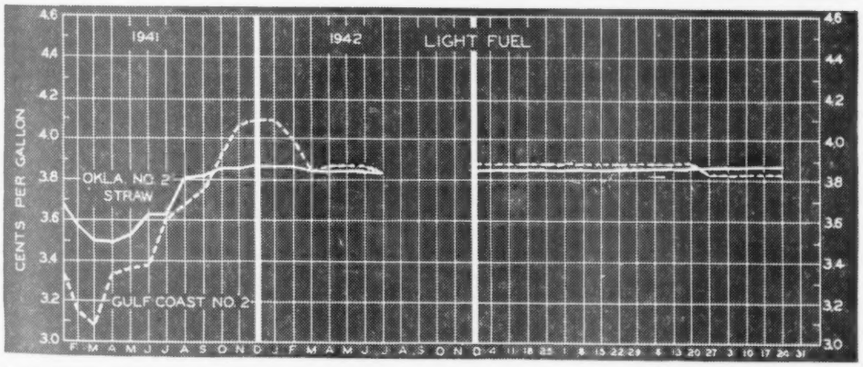
Refinery Prices

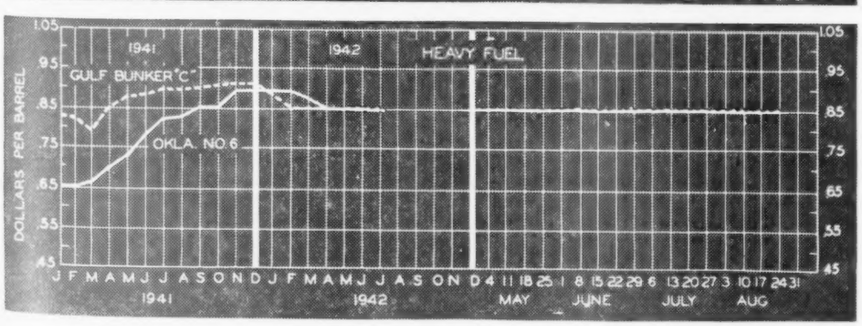
Monthly prices in graphs are averages of daily high and low prices shown in Platt's Oilgram Weekly prices are averages of high and low prices shown in Monday Oilgram, and in NPN











Pacific Coast Taxable Gasoline Sales

(Reported by California Oil & Gas Assn. Thousands of gallons)

	Month of June 1942	Month of June 1941	% of Change
Arizona	9,963	10 639	— 6.35
California	162,860	176,368	— 7.66
Nevada	4,431	4,292	+ 3.24
Oregon	23,130	25,643	— 9.80
Washington	31,270	34,142	— 8.41
Total 5 States	231,654	251,084	— 7.74

	6 Months total (January-June) 1942	6 Months total (January-June) 1941	% of Change
Arizona	58 394	60,733	— 3.85
California	956 502	1,007,532	— 5.06
Nevada	21,576	18.867	+14.36
Oregon	127,247	134 523	— 5.41
Washington	181,797	190,720	— 4.68
Total 5 States	1,345,516	1,412,375	— 4.78

Oil Burner Statistics

(Compiled by Bureau of Census. Figures include burners consuming Commercial Standard No. 1 fuel oil or heavier.)

	June 1942	May 1942	June 1941	June 1940
New orders, less cancellations	9,396	10,680	32,521	19,672
Unfilled orders, end of month	18,763	17,843	22,448	5,985
Shipments	8,441	9,171	32 685	18,387
Stocks, end of month	40,170	41,277*	27,202	19,367

	6 Months Total (January-June) 1942	1941	1940
New orders, less cancellations	81,483	149,211	90,945
Shipments	80,779	134,806	87,865

*Revised.

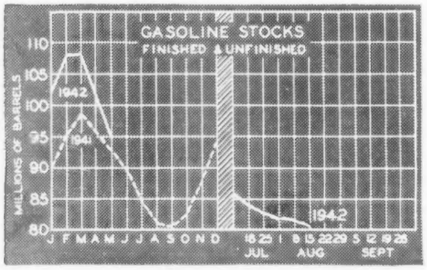
Pennsylvania Crude Runs

(Compiled by National Petroleum Assn. from reports of all companies which refined Pennsylvania crude. Figures in barrels.)

Week Ended	Daily Average	Week Ended	Daily Average
Jan. 3	72,172	May 2	80,399
Jan. 10	77,676	May 9	80,761
Jan. 17	81,658	May 16	86,551
Jan. 24	84,089	May 23	85,563
Jan. 31	82,603	May 30	80,046
Feb. 7	74,927	June 6	83,996
Feb. 14	77,436	June 13	83,808
Feb. 21	82,682	June 20	83,648
Feb. 28	84,173	June 27	80,837
Mar. 7	80.131	July 4	77,973
Mar. 14	76,862	July 11	83,919
Mar. 21	79,510	July 18	84,892
Mar. 28	84,185	July 25	67,243
Apr. 4	78,175	Aug. 1	77,757
Apr. 11	82,557	Aug. 8	72,336
Apr. 18	82,067	Aug. 15	83,256
Apr. 25	79,353	1941 Low	61,384
		1941 High	84,326

STATISTICS

Monthly figures are actual as reported by Bureau of Mines. Weekly figures are as estimated by American Petroleum Institute on Bureau of Mines basis, except crude stocks which are as reported by Bureau of Mines.


GASOLINE STOCKS
FINISHED & UNFINISHED
MILLIONS OF BARRELS
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1941
1942
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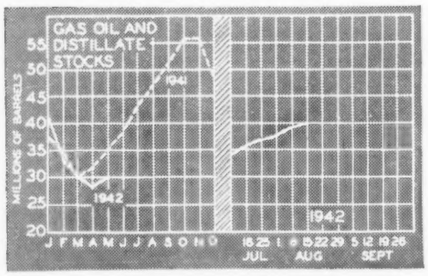
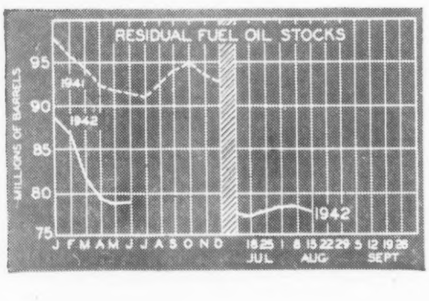
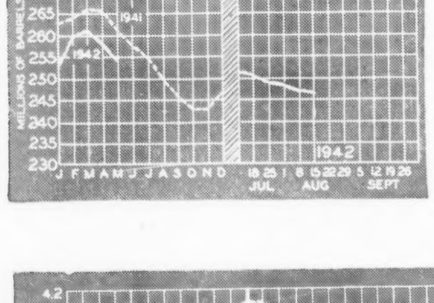
JUL AUG SEPT







Refinery Operations

(American Petroleum Institute figures in thousands of barrels of 42 gallons each. Figures include reported totals plus an estimate of unreported amounts and are therefore on a Bureau of Mines basis.)

Districts	Daily Potential Refining Capacity Week Ended Aug. 15	Daily Potential Refining Capacity Week Ended Aug. 8	Per Cent of Refining Capacity Reporting Week Ended Aug. 15	Per Cent of Refining Capacity Reporting Week Ended Aug. 8	Daily Average Crude Runs to Stills Week Ended Aug. 15	Daily Average Crude Runs to Stills Week Ended Aug. 8	Per Cent of Reporting Capacity Operated Week Ended Aug. 15	Per Cent of Reporting Capacity Operated Week Ended Aug. 8
Combined‡	2,440	2,440	88.2	88.2	1,670	1,627	68.4	66.7
Appalachian	176	176	84.8	84.8	164	142	93.2	80.7
Ind., Ill., Ky.	804	804	83.3	83.3	740	715	92.0	88.9
Okla., Kans., Mo.	416	416	80.1	80.1	365	366	87.7	88.0
Rocky Mt.	147	147	48.0	48.0	89	89	60.5	60.5
California	817	817	89.9	89.9	683	622	83.6	76.1
TOTAL U. S.—B. of M. Basis	4,800	4,800	85.6	85.6	3,711	3,561	77.3	74.2
U. S.—B. of M. Basis Aug. 16, 1941					3,990			

Districts	Gasoline Production at Refineries inc. Natural Blended Week Ended Aug. 15	Gasoline Production at Refineries inc. Natural Blended Week Ended Aug. 8	Stocks of Finished and Unfinished Gasoline Week Ended Aug. 15	Stocks of Finished and Unfinished Gasoline Week Ended Aug. 8	Total Stocks Gas Oil & Distillates Week Ended Aug. 15	Total Stocks Gas Oil & Distillates Week Ended Aug. 8	Total Stocks Residual Fuel Oil Week Ended Aug. 15	Total Stocks Residual Fuel Oil Week Ended Aug. 8
Combined‡	5,011	5,020	38,589	38,764	20,143	19,410	17,714	17,988
Appalachian	426	424	2,830	2,736	556	584	546	550
Ind., Ill., Ky.	2,618	2,569	14,814	15,092	5,261	5,073	3,846	3,768
Okla., Kans., Mo.	1,203	1,237	6,725	7,021	1,662	1,603	1,315	1,419
Rocky Mt.	289	293	2,047	2,111	424	412	553	567
California	1,578	1,612	15,703	15,553	11,995	11,942	53,448	54,283
Total U. S.—B. of M. Basis	11,125	11,155	80,708°	81,277°°	40,041	39,024	77,422	78,575
U. S.—B. of M. Basis Aug. 16, 1941	12,924		82,312		45,368		93,365	

°Finished 72,446,000 bbls.; unfinished 8,262,000 bbls.
°°Finished 73,334,000 bbls.; unfinished 7,943,000,000 bbls.
‡Includes East Coast, Inland Texas, Texas Gulf, Louisiana Gulf, and North Louisiana-Arkansas districts

Crude Oil Stocks

(Bureau of Mines figures in thousands of barrels)

Grade or Origin	Aug. 8	Aug. 15	Change
Pennsylvania Grade	3,415	3,375	— 40
Other Appalachian	1,380	1,298	— 82
Lima-Michigan	1,615	1,756	+141
Illinois-Indiana	12,381	11,764	—617
Arkansas	2,584	2,597	+ 13
Kansas	7,473	7,495	+ 22
Louisiana:	13,866	13,481	—385
Northern	5,147	4,961	—186
Gulf Coast	8,719	8,520	—199
Mississippi	1,777	1,651	—126
New Mexico	6,168	5,982	—186
Oklahoma	45,797	46,064	+267
Texas:	99,006	99,358	+352
East Texas	26,589	26,018	—571
West Texas	24,005	24,282	+277
Gulf Texas	25,418	26,208	+790
Other Texas	22,994	22,850	—144
Panhandle	4,424	4,439	+ 15
North	6,524	6,281	—243
South	4,575	4,778	+203
Other	7,471	7,352	—119
Rocky Mountain	15,354	15,559	+205
California	35,827	35,891	+ 64
Foreign	332	162	—170
Total U. S. refinable	246,975	246,433	—542
Heavy in California	10,756	10,479	—277

N.P.N. Gasoline Index

	Dealer T.W. Cents Per Gallon	Tank Car Cents Per Gallon
Aug. 24	10.47	6.68
Month ago	11.42	7.10
Year ago	10.02	6.70

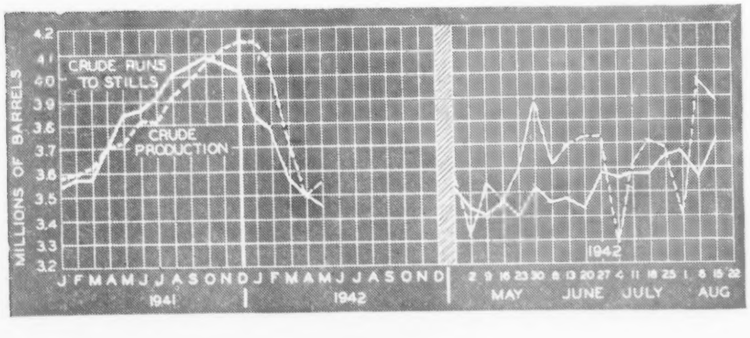
Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is a weighted average of following wholesale markets for regular-grade gasoline, FOB refineries or terminals: Okla., Mid-Western, W. Penna., Calif., N. Y. Harbor, Philadelphia, Jacksonville, Boston and Gulf Coast.

Ohio Taxable Gasoline Consumption

(Compiled by Ohio Petroleum Marketers Assn. from state tax reports)

Month	Gallons
June, 1942	122,811,410
June, 1941	137,889,103
Loss	15,077,693
% of loss	10.94
Jan.-June, 1942	688,338,057
Jan.-June, 1941	730,486,224
Loss	42,148,167
% of loss	5.77

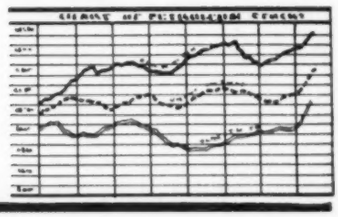

CRUDE RUNS TO STILLS
CRUDE PRODUCTION
MILLIONS OF BARRELS
1942
J F M A M J J A S O N D J F M A M J J A S O N D
1941
1942
2 9 16 23 30 6 13 20 27 4 11 18 25 1 8 15 22
MAY JUNE JULY AUG

Crude Oil Production

(American Petroleum Institute figures)

	WEEK ENDED Aug. 15 Barrels (Daily Average)	WEEK ENDED Aug. 8 Barrels (Daily Average)		WEEK ENDED Aug. 15 Barrels (Daily Average)	WEEK ENDED Aug. 8 Barrels (Daily Average)
Oklahoma	376,750	389,200	Eastern (Ill. & Ind. excluded)	97,250	92,400
Kansas	290,750	256,250	Michigan	63,100	62,400
Nebraska	3,400	3,550	Wyoming	87,700	91,900
Texas	1,383,750	1,484,100	Montana	23,200	23,250
Louisiana	332,600	331,900	Colorado	6,700	6,600
Arkansas	72,550	72,550	N. Mexico	73,450	70,650
Mississippi	77,700	75,200	California	732,600	709,800
Illinois	255,000	281,650			
Indiana	16,950	19,050	Total U. S.	3,893,450	3,970,450

Oil MARKETS



Pennsylvania

CLEVELAND, Aug. 22.—Unabated demand for all light products continued in Western Pennsylvania. Refiners generally report shipping daily production "and then some". Any reductions in local demand due to agricultural lull more than offset by incessant call from Eastern suppliers. Light products quotations were generally unchanged, but one upper field refiner stated he was now getting 6.5c for 36-40 fuel, 0.25c higher than his previous price. Another withdrew his quotation for this product, while a third continued to quote 6.25c.

Cylinders "stronger than ever". Bright stock still closely held. Neutrals movement "a little better", ascribed by some sources as due to Sept. 30 deadline for canning motor oils. Quotations for 25 pour test neutrals ranged from 30 to 33c for 200 Vis. and 28 to 31 for 150 Vis., a reduction of 1c on the "low" of the latter for the week.

Mid-Continent

TULSA, Aug. 22.—No let-up was apparent in heavy demand for most refined products the past week, according to Mid-Continent refiners, while supplies for the most part continued tight and scarcity of tank cars delayed shipments.

Expected slackening of agricultural demand with end of harvest was more than taken up by East Coast calls, some refiners said. Demand for light fuel oils was said to be "exceedingly heavy" by several refiners. Oklahoma refiner advanced his quotations 0.125c for both 41-43 and 42-44 w.w. kerosine, reflecting unabated demand greater than he could supply; his new quotations fell within existing ranges.

Tank car situation appeared no better, and many refiners said they were turning down inquiries, both inter-refinery and East Coast, due to difficulty of securing cars as well as low supplies.

Demand for lubes continued "good"; "excellent" for solvent refiner grades. Supply situation generally revealed no surplus but adequate working stocks.

Call for 26-70 natural gasoline continued generally unchanged. Last reported quotations were at 3.625c FOB Group 3 and 3.25c FOB Breckenridge.

Gulf

NEW YORK, Aug. 22.—Price for 72-74 oct. gasoline in cargo lots was up 0.125c on low of price range at the Gulf to 5.25c late the past week when one refiner advanced his quotation to 5.25c. Other refiners' quotations ranged up to 6c. Otherwise, cargo market was quiet, with no inquiries or open spot sales in cargo lots, or changes in quotations for other refined products except for bunker "C" down 5c on high at 0.85-0.90.

Active inquiry for all products in tank car lots, sellers' transportation, generally continued without let-up, most refiners said, bringing with them several reported sales. One refiner sold 8000 bbls. 72 oct. leaded gasoline at 5.25c for shipment in buyer's cars to East Coast "as rapidly as cars available". Another sold 500 cars No. 2 fuel "at the top price" for shipment east over September, October and November. When asked what the "top price" was, refiner replied "3.75c". Refiners quotations ranged 3.75-3.875c for No. 2 in cargo lots.

Refiners said sellers "would have no trouble" securing 5.75c for 72-74 oct. gasoline in their cars although refiners' cargo quotations ranged 5.25-6c.

Atlantic Coast

NEW YORK, Aug. 22.—Refined products markets along the Atlantic Seaboard showed little or no change from dormant condition prevailing since recent price reductions. Limited inshipments, steady demand despite rationing and curtailment, and resultant tightness of material reported along the entire coast. Industrial call for heavy fuels remains strong.

Suppliers' asking prices unchanged at all points.

California

LOS ANGELES, Aug. 22.—Gasoline prices continue to weaken. One large independent refiner is offering third-grade gasoline delivered in Los Angeles in loads of 3000 gal. or more for 4.75c. Same refiner selling regular for 6c, FOB refinery and Ethyl at 6.5c.

However, in an open letter to "Mr. Dealer", another independent refiner had this to say of the gasoline situation: "Well, he (meaning the independent refiner) just can't go on any longer carrying the load. . . . He has got to have a decent living margin or move out."

Another point of view expressed by an independent is that "there is not enough business to go around among the independents so we might as well have it out now and let the strongest remain."

Mid-Western

CHICAGO, Aug. 22.—The "high" of the price range for Ethyl reached 7.125c this past week as Mid-Western refiner advanced his quotation 0.125c. Other quotations on the 78 oct. product ranged down to 6.75. No additional price quotations changes were reported.

Gasoline continued "tight" throughout the week; refiners and marketers reported an "extremely heavy demand" for kerosine and fuel oils. One supplier said that he was not taking any local orders other than previous commitments, and added that "he anticipated a lot of trouble filling those".

Mid-Western refiners' and marketers' consternation over the tank car situation was brought to head at close of week with OPC Directive No. 57 banning tank car shipment of gasoline in some 20 states, and will force reorganization of traffic methods aimed at full utilization of available pipelines, trucks and barges.

Index of Governmental Orders Concerning Petroleum Prices

Orders, "requests", "ceilings", and other statements issued by governmental agencies concerning prices of petroleum and products, prices for which are published in this market section of NATIONAL PETROLEUM NEWS, have been published as follows:

	NATIONAL PETROLEUM NEWS	PLATT'S OILGRAM	Platt's OIL-Law-GRAM
Nov. 21, '41—Maximum prices for paraffin wax	Nov. 26, pg. 5	Nov. 21, pg. 1	Pg. 66
Jan. 17, '42—OPA letter restating contents of letters of Nov. 7, 10 and 28, '41	Jan. 21, pg. 7	Jan. 19, pg. 1	Pg. 135
Jan. 28, '42—Amendment No. 1 to paraffin wax price schedule	Feb. 11, pg. 20	Jan. 29, pg. 1	Pg. 153
Feb. 2, '42—OPA Price Schedule No. 88	Feb. 11, pg. 17	Feb. 4, pg. 1	Pg. 159
Feb. 5, '42—Amendment No. 1 to OPA Price Schedule No. 88	Feb. 11, pg. 18	Feb. 9, pg. 1	Pg. 167
Feb. 7, '42—Amendment No. 2 to OPA Price Schedule No. 88	Feb. 11, pg. 18	Feb. 9, pg. 1	Pg. 167
Amendment No. 1 to Revised Price Schedule No. 88 (Combined form of Schedule 88 and its 4 previously issued amendments)	Mar. 11, pg. 15	Mar. 7, pg. 1	Pg. 205
Mar. 25, '42 — Maximum prices for Penna. grade crude	Apr. 1, pg. 19	Mar. 25, pg. 1	Pg. 237
Mar. 26, '42—Maximum s.s. prices for regular-grade gasoline in East Coast & Pacific Northwest	Apr. 1, pg. 11	Mar. 25, pg. 4	Pg. 243
Mar. 26, '42—Approval of 0.5c advance in gasoline, Atlantic Coast states	Apr. 1, pg. 10	Mar. 25, pg. 4	Pg. 241
Mar. 26, '42—Approval of 0.4c advance in kerosine and light fuels, Atlantic Coast states	Apr. 1, pg. 10	Mar. 25, pg. 4	Pg. 241
Mar. 26, '42—Maximum prices for Bunker "C" & No. 6 fuel, East & Gulf Coasts	Apr. 1, pg. 11	Mar. 25, pg. 4	Pg. 242
Apr. 4, '42—Minimum 3c margin for operators in Curtailment Area	Apr. 8, pg. 3	Apr. 7, pg. 2	Pg. 271
Apr. 4, '42—Prices for crude from wells opened since Oct. 1, 1941	Apr. 8, pg. 5	Apr. 6, pg. 1	Pg. 273
Apr. 18, '42—Price advance for Ritchie, La. crude	Apr. 22, pg. 10	Apr. 20, pg. 2	Pg. 309
Apr. 27, '42—Tank wagon prices: Arkansas, Montana, New Mexico, Oklahoma, Wyoming	May 13, pg. 7	Apr. 29, pg. 1	Pg. 353
Apr. 28, '42—East Coast advance effective Apr. 30	Apr. 29, pg. 3	Apr. 29, pg. 1	Pg. 356
Apr. 28, '42—Maximum service station prices	May 6, pg. 12	Apr. 29, pg.	Pg. 356
May 12, '42—Maximum prices Pacific Coast area	May 20, pg. 7	May 14, pg. 2	Pg. 402
May 26, '42—Discounts frozen at Oct. 1-15, '41 levels	June 3, pg. 9	May 27, pg. 1	Pg. 439
June 27, '42—East Coast advance effective June 29	July 1, pg. 3	June 27, pg. 1	Pg. 534
Aug. 3, '42—East Coast decrease effective Aug. 5	Aug. 1, pg. 1	Aug. 5, pg. 3	Pg. 649

REFINERY and SEABOARD PRICES

In bulk lots by Motor Transport, Tank Car, Barge or Tanker as shown

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

HOW PRICES ARE REPORTED—

Refinery and Seaboard prices in National Petroleum Ne vs are gathered by PLATT'S OILGRAM and are published in the Monday issue of the OILGRAM.

PLATT'S OILGRAM is a reporting service issued in three identical editions daily from News Bureaus at New York, Cleveland, and Tulsa, Okla. PLATT'S OILGRAM gathers and publishes what its publisher and representatives believe to be accurate news of sales, prices and current happenings affecting the oil industry and that will be of interest to its subscribers. As this information is usually private, OILGRAM reports it according to what it is able to obtain from sources deemed reliable.

All information is supplied without guarantee as to its completeness, accuracy, time of transmission or promptness of delivery.

The subscriber receives this information for his private use and not for resale or further distribution.

Publisher reserves the right to change the extent, nature and form of showing this information at any time.

Prices shown in the tables are quotations (meaning sellers' general offers or posted prices , or actual sales prices, reported to OILGRAM by refiners for "open spot" transactions, except as otherwise specified.

Prices arrived at by discounts off a specified price or "market date of shipment," prices named in contracts or prices arrived at in accordance with any arrangement made prior to date of sale, are not for "open spot" transactions and therefore are not considered in making the price tables. Prices made to brokers and prices in "Inter-refinery" transactions are also not considered except as may be noted.

All prices are for "immediate" shipment except in Gulf Coast bulk transactions where shipment is generally to be made in ninety days. Prices are FOB refineries, pipelines, or tanker terminals in districts designated.

Prices shown are for quantities in bulk such as tank car lots, motor transport lots or barge lots; and in cents per gallon; heavy fuel oils are in dollars per barrel of 42 U.S. gallons; wax and petrolatums are in cents per pound. Prices applying to barges or cargoes only are so designated.

Prices do not include taxes or inspection fees. Prices are published at the close of the business day.

Mid-Western prices in the tables were gathered from refiners with offices located in Chicago and the surrounding territory. While the prices are quoted on a Group 3 (Oklahoma) freight basis, this is in accordance with the custom of the oil industry which uses Group 3 as a price basis for the ease of comparing prices even when the material originates in another refining district. Other refinery prices are given by and for the particular refining district where the material is made and from which it is shipped.

When prices obtained by OILGRAM do not conform to these conditions the exception and the new conditions are noted in the news lead or in conjunction with the price table by footnote or otherwise, for the particular refinery or sales district involved.

Crude oil and products covered by OILGRAM'S news and price service, except where noted, have been represented to the publisher as fully up to the customary trade specifications indicated and according to the generally accepted methods of test: and all crude oil and all products thereof as having been lawfully produced and transported.

Any apparent error should be reported to the nearest OILGRAM or National Petroleum News office at once as no correction will be made after the second issue of the OILGRAM or National Petroleum News following its publication.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Summary of Daily Gasoline Prices (Aug. 11 to Aug. 17)

	Monday Aug. 24	Friday Aug. 21	Thursday Aug. 20	Wednesday Aug. 19	Tuesday Aug. 18
U. S. Motor, (ASTM octane)					
78 octane Ethyl:					
Oklahoma	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875
Mid-Western (Group 3 basis)	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7	6.75 – 7
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	7 (2)	7 (2)	7 (2)	7 (2)	7 (2)
72-74 octane:					
Oklahoma	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
Mid-Western (Group 3 basis)	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75 – 6	5.75 – 6	5.75 – 6	5.75 – 6	5.75 – 6
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6	6	6	6	6
63-66 octane:					
Oklahoma	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
Mid-Western (Group 3 basis)	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.375– 5.5	5.375– 5.5	5.375– 5.5	5.375– 5.5	5.375– 5.5
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75(1)	5.75 (1)	5.75 (1)	5.75 (1)	5.75 (1)
60 octane & below:					
Oklahoma	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
Mid-Western (Group 3 basis)	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	4.875– 5.25	4.875– 5.25	4.875– 5.25	4.875– 5.25	4.875– 5.25
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.25	5.25	5.25	5.25	5.25
Motor Gasoline, 72-74 octane (ASTM)					
New York harbor	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2
New York harbor, barges	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2
Philadelphia district	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7
Baltimore district	8.95	8.95	8.95	8.95	8.95
Motor Gasoline:					
Western Penna. Bradford-Warren:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75 (2)	7.5–7.75 (2)	7.5–7.75 (2)	7.5 –7.75 (2)	7.5 –7.75(2)
Western Penna. Other Districts:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3

REFINERY PRICES

Gasoline—U. S. Motor (ASTM) except where otherwise specified

Prices in Effect	Aug. 24	Aug. 17
OKLAHOMA		
78 oct. Ethyl	6.75 – 6.875	6.75 – 6.875
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.125– 5.25	5.125– 5.25
60-62 400 e.p.	5.125 (1)	5.125 (1)
MID-WESTERN (Group 3 basis)		
78 oct. Ethyl	6.75 – 7.125	6.75 – 7
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.1 – 5.25	5.1 – 5.25
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	6.6 – 7	6.6–7
72-74 oct.	5.75 – 6	5.75 – 6
63-66 oct.	5.375– 5.5	5.375– 5.5
60 oct. & below	4.875– 5.25	4.875– 5.25
60-62, 400 e.p.	5.375(1)	5.375 (1)
W. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	7 (2)	7 (2)
72-74 oct.	6	6
63-66 oct.	5.75(1)	5.75 (1)
60 oct. & below	5.25	5.25
CENT. W. TEX. (Prices to truck transports)		
80 oct. & above	7 (2)	7 (2)
72-74 oct.	5.875 (2)	5.875 (2)
67-69 oct.	5.375 (1)	5.375 (1)
62 oct. & below	5.125 (2)	5.125 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential teritory.)		
60 oct. & below	No Price	No Price
60-62, 400 e.p.	No Price	No Price
KANSAS (For Kansas destinations only)		
78 oct. Ethyl	7.25 (1)	7.25 (1)
72-74 oct.	6 –6.2 (2)	6 –6.2 (2)
63-66 oct.	5.625–5.8 (2)	5.625–5.8 (2)
60 oct. & below	5.25 –5.4 (2)	5.25 –5.4 (2)

Prices in Effect	Aug. 24	Aug. 17
ARK. (For shipment to Ark. & La.)		
72-74 oct., leaded	6 (1)	6 (1)
70-72 oct. "	5.875(1)	5.875 (1)
62 oct. "	5.5(1)	5.5 (1)
60 oct. & below, unleaded	5.375(1)	5.375 (1)
WESTERN PENNA. (Motor gasoline)		
Bradford-Warren:		
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75 (2)	7.5–7.75 (2)
Other districts:		
"Q" Gasoline Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
U.S. Motor: (Oct. ASTM):		
72-74 oct.	8 – 8.5	8 – 8.5
67-69 oct.	7.5 – 8 (2)	7.5 – 8 (2)
Str. run gasoline, excluding Detroit shpt.	5 – 6	5 – 6
OHIO (S. O. Ohio quotations for statewide delivery and subject to exceptions for local price disturbances)		
72-74 oct.	8.375	8.375
CALIFORNIA U.S. Motor:		
78 oct. & above (Ethyl)	6.5 – 8.75	7 – 8.75
70-75 oct. (regular)	6 – 7.75	6 – 7.75
65 oct. & below (3rd grade)	4.5 – 6.75	4.5 – 6.75

Kerosine, & Gas Fuel Oils

Prices in Effect	Aug. 24	Aug. 17
OKLAHOMA		
41-43 grav. w.w.	4.375– 4.5	4.375– 4.5
42-44 grav. w.w.	4.5 – 4.625	4.5 – 4.625
Range Oil	4 – 4.375	4 – 4.375
No. 1 P.W.	3.875– 4.25	3.875– 4.25
No. 1 straw	3.875– 4 (1)	3.875– 4 (1)
No. 2 straw	3.6 – 4.125	3.6 – 4.125
No. 3 fuel	3.5 (2)	3.5 (2)
U. G. I. Gas Oil	3.625–3.75 (1)	3.625–3.75 (1)
No. 6 fuel	$0.80-$0.90(2)	$0.80-$0.90(2)
14-16 fuel	$0.95 (1)	$0.95 (1)
MID-WESTERN (Group 3 basis)		
41-43 grav. w.w.	4.375– 4.625	4.375– 4.625
42-44 grav. w.w.	4.5 (2)	4.5 (2)
Range Oil	4 – 4.1	4 – 4.1
No. 1 p.w.	3.875– 4.125	3.875– 4.125
No. 2 straw	3.6 – 3.625	3.6 – 3.625
No. 3	3.5	3.5
No. 5	$0.85 (1)	$0.85 (1)
No. 6	$0.80-$0.85(2)	$0.80-$0.85(2)
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
41-43 grav. w.w.	4.125– 4.75	4.125– 4.75
No. 1 P.W.	4.1 –4.2 (2)	4.1 –4.2 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
41-43 grav. w.w.	No Price	No Price
No. 1 straw	4.3 (1)	4.3 (1)
KANSAS (For Kansas destinations only)		
41-43 grav. w.w.	No Price	No Price
42-44 gravity w.w.	4.8 –4.875 (2)	4.8 –4.875 (2)
No. 1 p.w.	4.25–4.3 (2)	4.25–4.3 (2)
No. 6 fuel	$0.90(1)	$0.90 (1)

REFINERY PRICES (Continued)

(NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.)

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Kerosine, Gas & Fuel Oil

(Continued)

Prices in Effect	Aug. 24	Aug. 17
ARK. (For shipment to Ark. and La.)		
41-43 grav. w.w.	4.625 (1)	4.625 (1)
No. 1	4 (1)	4 (1)
No. 2	3.5 (1)	3.5 (1)
No. 3 fuel	3.5 (1)	3.5 (1)
Tractor fuel, for shpt. to Ark. points only.	5.125 (1)	5.125 (1)
WESTERN PENNA.		
Bradford-Warren:		
45 grav. w.w.	6.25 – 7.75	6.25– 7.75
46 grav. w.w.	....	....
No. 1 fuel	6.25 – 7.75	6.25– 7.625
No. 2 "	6.25 – 7.625	6.25– 7.75(2)
No. 3 "	6.25–7.75 2)	6.125–7.625
36-40 gravity	6.25 –6.5(2)	6.25
Other districts:		
45 grav. w.w.	6.125– 7.625	6.125– 7.625
46 grav. w.w.	6.125– 6.25	6.125– 6.25
47 grav. w.w.	6.25 – 6.375	6.25 – 6.375
No. 1 fuel	5.875– 6	5.875– 6
No. 2 "	5.875– 7.125	5.875– 7.125
No. 3 "	5.875– 7.125	5.875– 7.125
36-40 grav., Pittsburgh dist. prices excluded	5.875– 7	5.875– 7
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
47-49 gravity w.w.	5.75 – 6	5.75 – 6
P.W. Distillate	5.5	5.5
No. 3 gas oil, Straw.	5	5
U.G.I. gas oil	4.5 (2)	4.5 (2)
Fuel Oils (Vis. at 100).		
300-500 Vis.	4.5 (1)	4.5 (1)
100-300 Vis.	4.5	4.5
OHIO (S. O. quotations for statewide delivery)		
Kerosine	7	7
CALIFORNIA		
40-43 grav. w.w.	4.5 – 7	4.5 – 7
San Joaquin Valley:		
Heavy fuel	$0.85 (2)	$0.85 (2)
Light fuel	$0.95 (2)	$0.95 (2)
Diesel fuel	4 (2)	4 (2)
Stove dist.	5 (1)	5 (1)
Los Angeles:		
Heavy fuel	$0.80–0.85(2)	$0.80–0.85(2)
Light fuel	$0.85–0.95(2)	$0.85–0.95(2)
Diesel fuel	3.5 – 4 (2)	3.5 – 4 (2)
Stove dist.	3 – 5 (2)	3 – 5 (2)
San Francisco:		
Heavy fuel	$0.90 (1)	$0.90 (1)
Light fuel	$1.00 (1)	$1.00 (1)
Diesel fuel	4.5 (1)	4.5 (1)
Stove dist.	5.5 (1)	5.5 (1)

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Lubricating Oils

WESTERN PENNA.

Prices are for sales made, or offers reliably reported, to jobbers & compounders only.

Viscous Neutrals—No. 3 col. Vis. at 70°F.

200 Vis. (180 at 100°) 420-425 fl.		
0 p.t.	40.5 (1)	40.5 (1)
10 p.t.	39.5 (1)	39.5 (1)
15 p.t.	38.5 (1)	38.5 (1)
25 p.t.	30–33	30–33
150 Vis. (143 at 100°) 400-405 fl.		
0 p.t.	38.5 (1)	38.5 (1)
10 p.t.	37.5 (1)	37.5 (1)
15 p.t.	36.5 (1)	36.5 (1)
25 p.t.	28–31	29–31
Cylinder Stocks		
Brt. stk., 145-155 vis. at 210°, 540-550 fl., No. 8 col.		
10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	25	25
600 S.R. filterable	15	15
650 S.R.	15.5	15.5
600 fl.	16	16
630 fl.	17	17
MID-CONTINENT (F. o. b. Tulsa)		
Neutral Oils (Vis. at 100° F. 0 to 10 P.P.)		
Pale Oils:		
Vis. Color		
60-85—No. 2	8	8
86-110—No. 2	8.5	8.5
150—No. 3	14.5	14.5
180—No. 3	15	15
200—No. 3	15	15
250—No. 3	16–16.5	16–16.5
280—No. 3	17	17
300—No. 3	18	18

Lubricating Oils (Cont'd)

Prices in Effect	Aug. 24	Aug. 17
Red Oils:		
180—No. 5	15 (1)	15 (1)
200—No. 5	15 (1)	15 (1)
280—No. 5	No Price	No Price
300—No. 5	17.5 (2)	17.5 (2)

Note: Viscous Neutrals, 15-25 p.p. generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p.; generally are quoted 0.25c under 0-10 p.p. oils.

Bright Stock—Vis. at 210°		
200 Vis. D	27 (1)	27 (1)
150-160 Vis. D:		
0 to 10 p.p.	23	23
10 to 25 p.p.	22.5–23	22.5–23
25 to 40 p.p.	23 (1)	23 (1)
150-160 Vis. E	22 (2)	22 (2)
120 Vis. D:		
0 to 10 p.p.	22 (2)	22 (2)
600 S.R. Dark Green	8.5 (1)	8.5 (1)
600 S.R. Olive Green	10–11	10–11
631 S.R.	18.5 (1)	18.5 (1)
Black Oil	5.5 (1)	5.5 (1)

SOUTH TEXAS Neutral Oils

Vis. Color		
Pale Oils: (*Vis. at 100° F.*)		
100 No. 1½-2½	6.5	6.5
200 No. 2-3	8.75	8.75
300 No. 2-3	9.25	9.25
500 No. 2½-3½	10	10
750 No. 3-4	10.25	10.25
1200 No. 3-4	10.375	10.375
2000 No. 4	10.5	10.5
Red Oils:		
100 No. 5-6	6.5 (2)	6.5 (2)
200 No. 5-6	8.75	8.75
300 No. 5-6	9.25	9.25
500 No. 5-6	10	10
750 No. 5-6	10.25	10.25
1200 No. 5-6	10.375	10.375
2000 No. 5-6	10.5–11.5	10.5–11.5

CHICAGO (From Mid-Continent p.l. crude.)

Neutral oils (Vis. at 100° F. 0 to 10 p.p.)

Pale Oils

Vis. Color		
60-85—No. 2	9.5 (1)	9.5 (1)
86-110—No. 2	10 (1)	10 (1)
150—No. 3	15.5 (1)	15.5 (1)
180—No. 3	16 (1)	16 (1)
200—No. 3	16 (1)	16 (1)
250—No. 3	17 (1)	17 (1)
Red Oils:		
180—No. 5	16 (1)	16 (1)
200—No. 5	16 (1)	16 (1)
250—No. 5	17 (1)	17 (1)
280—No. 5	18 1)	18 (1)
300—No. 5	18.5 (1)	18 5 (1)

Note: Viscous oils, 15 to 30 p.p. are quoted 0.5c lower; 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., 0.25c lower.

Unfiltered Steam Refined: (Viscosity at 210°)		
140	11.5 (1)	11.5 (1)
160	12.5 (1)	12.5 (1)
200	13.5 (1)	13.5 (1)
Bright stocks, 160 vis. at 210 No. 8 color:		
0 to 10 p.p.	24 (1)	24 (1)
15 to 25 p.p.	23.5 (1)	23.5 (1)
30 to 40 p.p.	21.5 (1)	21.5 (1)
E filtered Cyl. Stock	15.5 (1)	15.5 (1)

Note: To obtain prices delivered in Chicago, add 0.25c per gal.

Natural Gasoline

(Group 3 & Breckenridge prices are to blenders on freight basis shown below. Shipments may originate in any Mid-Continent manufacturing district.)

FOB GROUP 3		
Grade 26-70	3.625 (Qtns.)	3.625 (Qtns.)
FOB BRECKENRIDGE		
Grade 26-70	3.25 (Qtns.)	3.25 (Qtns.)
CALIFORNIA (FOB plants in Los Angeles basin) 21 pound vapor pressure for blending	4.75–5.375 (2)	4.75–5.375 (2)

Naphtha and Solvent

Prices in Effect	Aug. 24	Aug. 17
(FOB Group 3)		
Stoddard solvent	6.625	6.625
Cleaners' naphtha	7.125	7.125
V. M. & P. naphtha	7.125	7.125
Mineral spirits	6.125	6.125
Rubber solvent	7.125	7.125
Lacquer diluent	7.375– 8.125	7.375– 8.125
Benzol Diluent	7.875– 8.625	7.875– 8.625
WESTERN PENNA.		
Bradford-Warren District:		
Stoddard Solvent	7.5 (1)	7.5 (1)
Other Districts:		
Untreated naphtha	7 (2)	7 (2)
Stoddard solvent	7.25 – 7.75	7.25 –7.75
OHIO (S. O. quotations for statewide delivery): V.M.&P. naphtha, D.C. naphtha, Varnolene & Sohio solvent	10	10
Rubber solvent	9	9

Wax

White Crude Scale:

WESTERN PENNA. (Bbls. C.L.)		
122-124 A.m.p.	4.25 (2)	4.25
124-126 A.m.p.	4.25	4.25
OKLAHOMA (C.L., FOB Refinery)		
Semi-refined:		
128 AMP min., white, 50 kilo bags	No Price	No Price
132-134 AMP, bbls.	5.25 (1)	5.25 (1)

CHICAGO (FOB Chicago district refinery of one refiner, in bags, carloads. Carloads, slabs loose 0.4c less. Melting points are EMP (ASTM) methods; add 3° to convert into AMP.)

Fully refined:		
122-124 (bags only)	5.6	5.6
125-127	6	6
127-129	6.25	6.25
130-132	6.55	6.55
132-134	6.8	6.8
135-137	7.55	7.55

Petrolatums

WESTERN PENNA. (Bbls., carloads; tank cars, 0.5c per lb. less.)		
Snow White	6.125– 7.25	6.125– 7.25
Lily White	5.375– 6.125	5.375– 6.125
Cream White	4.375– 5.375	4.375– 5.375
Light Amber	3.375– 3.875	3.375– 3.875
Amber	3.125– 3.625	3.125– 3.625
Red	3 – 3.5	3 – 3.5

Group 3 Freight Rates

To Division Headquarters Points of Standard Oil Co. of Indiana

(Cents Per Gal.)

	Gasoline Kerosine	*Distillate Fuel Oil	Gas Oil and or Residual Fuel Oil
Chicago, Ill.	2.508	2.508	2.516
Decatur, Ill.	2.244	2.244	2.442
Joliet, Ill.	2.508	2.508	2.516
Peoria, Ill.	2.310	2.310	2.442
Quincy, Ill.	2.178	2.178	2.294
Indianapolis, Ind.	2.640	3.034	3.034
Evansville, Ind.	2.442	2.886	2.886
South Bend, Ind.	3.135	3.135	3.330
Detroit, Mich.	4.290	3.996	3.996
Grand Rapids, Mich.	3.828	3.828	3.922
Saginaw, Mich.	4.290	4.144	4.144
Green Bay, Wis.	2.838	2.838	3.182
Milwaukee, Wis.	2.706	2.706	2.738
La Crosse, Wis.	2.574	2.574	2.886
Minneapolis-St. Paul	2.574	2.574	2.886
Duluth, Minn.	2.838	2.838	3.256
Mankato, Minn.	2.574	2.574	2.886
Des Moines, Ia.	2.046	2.046	2.294
Davenport, Ia.	2.310	2.310	2.442
Mason City, Ia.	2.376	2.376	2.664
St. Louis, Mo.	2.046	2.046	2.072
Kansas City, Mo.	1.518	1.518	1.776
St. Joseph, Mo.	1.518	1.518	1.776
Fargo, N. D.	3.564	3.564	3.996
Huron, S. D.	3.036	3.036	3.330
Wichita			
From Ponca City	0.528	0.528	0.592
From Tulsa	0.858	0.858	0.962
From Cushing	0.792	0.792	0.888

*Not suitable for illuminating purposes.

SEABOARD PRICES EXPORT AND COASTWISE

(NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.)

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads

Atlantic Coast

(Prices are of refiners, FOB their refineries & their tanker terminals, & of tanker terminal operators FOB their terminals)—Prices In Effect Aug. 24

MOTOR GASOLINE

District:	Min. 80 Oct. '39 Research (Max. 2 cc. Lead)	72-74 Oct. (ASTM)	68-70 Oct. (ASTM)
N. Y. Harb.	9.8(1)	9.2 –10.2	9.2(1)
N. Y. Harb., barges	9.7(1	9.1 – 9.2	9.1(1)
Albany	....	9.3 – 9.5	....
Philadelphia	....	9.2 – 9.7	9.2(1)
Baltimore	....	8.95	8.85(1)
Norfolk	....	8.7 – 8.95	8.5(2)
Wilmington, N. C.	....	8.7 – 8.8	8.4-8.5(2)
Charleston	....	8.7 – 8.8	8.1-8.4(2)
Savannah	....	8.25 – 8.75	8.1)
Jacksonville	....	8.275- 8.4	8-8.275(2)
Miami	....	8.275- 8.4	7.9-8.275(2)
Tampa	....	7.5 – 8.4	8-8.275(2)
Pensacola	....	7 –7.2(1)	6.6 –6.8(1)
Mobile	....	6.87 – 7.27	6.6 –6.8(1)
New Orleans	....	6.25 – 6.75	....
Portland	....	9.5 – 9.8	....
Boston	....	9.4 – 9.7	9.7(1)
Providence	....	9.4 – 9.7	....

FUEL OILS

	KEROSINE and/or NO. 1 FUEL	No. 2	No. 3	No. 5	No. 6
N. Y. Harb.	6.8	6.7	6.7	$1.95-2.10 (a)	$1.65
N. Y. Harb., barges	6.7	6.6	6.6	....	....
Albany	7	6.8	6.8	$2.25(1)	$1.85(1)
Philadelphia	6.9	6.7	6.7	$1.98(2)	$1.65
Baltimore	6.9	6.7	6.7	....	$1.65
Norfolk	6.8 – 6.9	6.7	6.7(1)	....	$1.65(2)
Wilmington, N.C.	6.75	6.7	....	....	....
Charleston	6.9	6.7(2)	....	....	$1.60(2)
Savannah	6.75	....	....	....	$1.60(1)
Jacksonville	6.5	6.25(2)	6.25(1)	....	$1.60(1)
Miami	6.75(2)	....	....	....	....
Tampa	6.75	6.25(2)	....	....	$1.55 (1)
Pensacola	4.8(1)	....	....	....	....
Mobile	4.5 – 4.75	....	....	....	....
New Orleans	4.25 – 4.45	3.75 –3.875(2)	....	$1.25 (1)	$0.85(1)
Portland	7	6.8	6.8(2)	$2.25 (1)	$1.65(2)
Boston	6.9	6.7	6.7(2)	$1.95 (2)	$1.65
Providence	6.9	6.7	6.7	$1.90 –$1.95	$1.65

(a) This price is for a straight-run, low pour test No. 5 fuel.

	Bunker C Fuel Ships' bunkers (Ex Lighterage)	Diesel Oil Ships' bunkers (Ex Lighterage)	Diesel Oil Shore Plants	Gas House Gas Oil 28-34 Gravity
N. Y. Harbor	$1.65	$2.78	6.7-6.8(2)	6.8(2)
Albany	$1.85(1)	$2.98(1)	6.8(2)	7(1)
Philadelphia	$1.65	$2.78	....	....
Baltimore	$1.65	$2.78	6.7(1)	6.7(1)
Norfolk	$1.65	$2.78	6.7(1)	6.7(1)
Charleston	$1.60	$2.78(2)	6.7(1)	6.7(1)
Savannah	$1.60(1)	$2.62(1)	....	....
Jacksonville	$1.60(2)	$2.62(2)	....	....
Tampa	$1.55 (2)	$2.62(2)	....	....
New Orleans	$0.85	$1.55(2)	3.75(1)	3.75(1)
Portland	$1.65(2)	$2.86-2.88(2)*	6.6(1)	6.9(1)
Boston	$1.65	$2.78	6.7(2)	6.8(2)
Providence	$1.65	$2.78(2)	6.7(1)	6.8(1)

*Correct on and since Aug. 5.

Wax

(Melting points are AMP, 3° higher than EMP. Prices are FOB refinery and do not include bag, freight or export differentials).

Prices in Effect Aug. 24

Crude Scale:	New Orleans Export	N. Y. Domestic	N. Y. Export
124-6 Yellow	4.25(1)	....	4.25 (1)
122-4 White	....	4.25	4.25
124-6 White	4.25 (1)	4.25	4.25
Fully Refined:			
123-5	5.2 (1)	5.2 (2)	5.2 (1)
125-7	5.2 (1)	5.2 (2)	5.2 (1)
128-30	5.6 (1)	5.6	5.6 (1)
130-32	5.85 (1)	5.85 (2)	5.85 (1)
133-5	6.15 (1)	6.15	6.15 (1)
135-7	6.4 (1)	6.4 (1)	6.4 (1)

Naphtha

Prices in Effect Aug. 24

	V.M.&P. Naphtha	Mineral Spirits
New York Harbor	11 (2)	10
Philadelphia district	11 (2)	10
Baltimore	10.5 (2)	9.5
Boston	11.5 (2)	10.5
Providence	11.5 (1)	10.5 (2)

Pacific Export

(Quotations at seaboard, Los Angeles, cargo lots, except where otherwise noted.)

Prices In Effect	Aug. 24	Aug. 17
375 e.p. blend, 70 oct.	No Price	No Price
390 e.p. blend, 68 oct.	No Price	No Price
390 e.p. blend, 66 oct.	No Price	No Price
400 e.p. blend, 65 oct. min.	No Price	No Price
U. S. Motor, under 65 octane	No Price	No Price
38-40 grav., w.w. kero., 150 fire point	No Price	No Price
41-43 grav., w.w. kero.	No Price	No Price
44-grav. w.w. kero.	No Price	No Price
Diesel fuel, 24 & above	No Price	No Price
Diesel fuel, under 24	No Price	No Price
30-34 grav. diesel (gas oil) Pac. Spec. 200	No Price	No Price
Grade C fuel, Pac. Spec. 400	No Price	No Price
In Ship's Bunkers, or deep tank lots:		
Diesel fuel, Pac. Spec. 200	$1.40 –$1.45	$1.40 –$1.45
Grade C fuel, Pac. Spec. 400	$0.825-$0.85	$0.825-$0.85
Cased Goods: (Per case)		
375-400 e.p. blend, 65 oct. & above	No Price	No Price
400 e.p. blend, under 65 oct.	No Price	No Price
U. S. Motor	No Price	No Price
40-43 grav. w.w. kero., 150 fire point	No Price	No Price
Kero., p.w.	No Price	No Price

Tanker Rates

(Approximate last paid rates, cents per bbl.; Gulf-N. Atlantic, not East of N. Y.)

Hvy. Crude & Fuel (10 to 19.9 gravity)	48
Light Crude, (30 grav. or Lighter)	43
Gasoline	40
Kerosine	40
No. 2 Fuel	42

Note: 200% surcharge permitted on above rates by War Shipping Administration "to cover increased wartime operating expenses."

Gulf Coast

(Prices for sales made or firm offers reliably reported for sales pending in cargoes FOB ship at Gulf, for minimum of 20,000 bbls. Prices are by refiners only to other refiners, export agents, or to large tanker terminal operators at the customary trade specifications noted.)

Prices In Effect Aug. 24

Domestic

Motor Gasoline	
Min. 80 oct. '39 Research, max. 2cc lead	5.5
60-62 Gravity, Max. 400 e.p	
72-74 oct. leaded (ASTM)	5.25 – 6
70 oct. unleaded "	5.25 – 5.75
68 oct. " "	5.25 – 5.5
65 oct. " "	5.25 – 5.75
60 oct. "	5
41-43 w.w. kerosine	3.875– 4.375
No. 2 fuel	3.75 – 3.875
Gas Oil—Less than ½ of 1% sulfur.	
Below 43 diesel index	4
43-47 " "	4
48-52 " "	4
53-57 " "	4.125
58 & above diesel index	4.25
Diesel Oil, ship's bunkers (ex-lighterage)	$1.55 $1.68
Bunker C, " " "	$0.85 –$0.90
Bunker C, cargoes	$0.85

Export

Motor Gasoline	
60-62 Gravity, Max. 400 e.p.	
72-74 oct. leaded (ASTM)	5.25 – 6
70 oct. unleaded "	5.25 – 5.75
68 oct. " "	5.25 – 5.5
65 oct. " "	5.25 – 5.75
60 oct.	5
41-43 w.w. kerosine	3.875– 4.375
Gas Oil—Less than ½ of 1% sulfur.	
Below 43 diesel index	4
43-47 " "	4
48-52 " "	4
53-57 " "	4.125
58 & above diesel index	4.25

MID-CONTINENT LUBES

(At Gulf; in packages, FAS.; in bulk, FOB terminals)

Prices in Effect Aug. 24

	Steel Drums	Bulk
200 vis. D 210 brt. stock	34-35 (2)	28.8 (2)
150 vis. D 210 brt. stock 0-10 p.p.	30-31 (2)	24.8 (2)
10-25 p.p.	29.5 (1)	24.3 (1)
100 vis. D 210 brt. stock 0-10 p.p.	29.5 (1)	24.3 (1)
10-25 p.p.	29 (1)	23.8 (1)
200 vis. No. 3 col. neutral: 0-10 p.p.	22 (1)	16.8 (1)

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect Aug. 24, 1942 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. New Jersey

Esso (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gaso-line Taxes	Kero-sine T.W.
*Atlantic City, N. J.	10.2	10.7	4.5	9.4
*Newark, N. J.	10.2	10.7	4.5	9.4
Annapolis, Md.	10.55	11.05	5.5	11.2
Baltimore, Md.	9.95	10.45	5.5	10.2
Cumberland, Md.	11.35	11.85	5.5	11.7
Washington, D. C.	10.2	10.7	4.5	10.7
Danville, Va.	11.65	12.15	6.5	11.95
Norfolk, Va.	10.45	10.95	6.5	11.7
Petersburg, Va.	10.75	11.25	6.5	12.7
Richmond, Va.	10.75	11.25	6.5	12.7
Roanoke, Va.	11.95	12.45	6.5	12.2
Charleston, W. Va.	12.25	12.75	6.5	13
Parkersburg, W. Va.	11.55	12.05	6.5	12.7
Wheeling, W. Va.	11.55	12.05	6.5	13.3
Charlotte, N. C.	12.1	12.6	7.5	11
Hickory, N. C.	12.65	13.15	7.5	12
Mt. Airy, N. C.	12.5	13.0	7.5	11.2
Raleigh, N. C.	11.85	12.35	7.5	12
Salisbury, N. C.	12.15	12.65	7.5	12.4
Charleston, S. C.	10.95	11.45	7.5	....
Columbia, S. C.	11.8	12.3	7.5	....
Spartanburg, S. C.	12.5	13.0	7.5	....

	Mineral Spirits T.W.	V.M.&P. T.W.
Newark, N. J.	13	14.5
Baltimore, Md.	15.5	....
Washington, D. C.	15.5	....

Fuel Oils—T.W.	No. 1	No. 2	No. 3
Atlantic City, N. J.	9.4	8.7	8.7
Newark	9.4	8.7	8.7
Annapolis, Md.	....	8.95	....
Baltimore	9.2	8.7	8.7
Washington, D. C.	9.7	9.1	9.1
Norfolk, Va.	9.4	8.5	8.5
Petersburg	9.7	8.7	....
Richmond	9.7	8.7	8.7
Charlotte, N. C.	10	10.1	....
Hickory, N. C.	....	9.7	....
Raleigh	11	9.8	....
Charleston, S. C.	....	8.7	....
Columbia	....	9.7	....
Spartanburg	....	10.5	....

*Effective Aug. 5, '42 minimum retail resale price of 14.2c posted thru New Jersey.

Discounts:

Esso gasoline—to undivided dealers, 0.5c off dealer t.w.

Kerosine—1c off t.w. price for 25 gals. or more, under contract thru territory (Baltimore city contract not necessary) except no discount in state of New Jersey.

Naphthas—To buyers taking following quantities at one time: Newark, 2c per gal. on 200 gals. or more, less than 200 gals. 0.5c higher price; Baltimore, 2c off on 25 to 100 gals. and 3c on over 100 gals.; Washington, 2c off to contract buyers.

Socony-Vacuum Oil Co., Inc.

Socony Mobilgas (*Regular Grade*)

	Com. Cons. T.W.	Undiv. Dlr. T.W.	Gaso-line Taxes
New York City			
Manhattan & Bronx	10.1	10.6	*5.5
Kings & Queens	10.1	10.6	*5.5
Richmond	9.7	10.2	*5.5
Albany, N. Y.	9.9	10.4	5.5
Binghamton, N. Y.	11	11.5	5.5
Buffalo	10.2	10.7	5.5
Jamestown, N. Y.	10.4	10.9	5.5
Mt. Vernon, N. Y.	10.1	10.6	5.5
Plattsburg, N. Y.	11	11.5	5.5
Rochester, N. Y.	10.8	11.3	5.5
Syracuse, N. Y.	10.5	11	5.5
Bridgeport, Conn.	10	10.5	4.5
Danbury, Conn.	10.5	11	4.5
Hartford, Conn.	10.6	11.1	4.5
New Haven, Conn.	10	10.5	4.5
Bangor, Me.	10.7	11.2	5.5
Portland, Me.	10.3	10.8	5.5
Boston, Mass.	9.9	10.4	4.5
Concord, N. H.	11.4	11.9	5.5
Lancaster, N. H.	12	12.5	5.5
Manchester, N. H.	11.3	11.8	5.5
Providence, R. I.	10	10.5	4.5
Burlington, Vt.	10.9	11.4	5.5
Rutland, Vt.	11	11.5	5.5

	Mineral Spirits T.W.	V.M.&P. T.W.
Buffalo, N. Y.	12.4	13.6
New York City	11	12
Rochester, N. Y.	13.2	14.4
Syracuse, N. Y.	14	....
Boston, Mass.	12	13
Bridgeport, Conn.	†16.3	†17.3
Hartford, Conn.	†16.3	†17.3
Providence, R. I.	13	14

	Kero-sine Yard	Kero-sine T.W.	Mobil-fuel Diesel TC	Mobil-fuel Diesel TW	Mobil-heat Fuel Yard	Mobil-heat Fuel T.W.
New York:						
Manhat'n & Bronx	7.1	9.5	....	9	7	8.7
Kings & Queens	7.1	9.5	....	9	7	8.7
Richmond	7	9.5	....	....	6.9	8.5
Albany	7.2	9.2	7	9	7	8.7
Binghamton	8.6	10.6	....	10.4	8.4	9.9
Buffalo	8.3	10.3	8	10	8.2	9.7
Jamestown	8.4	10.4	....	10.3	8.3	9.7
Mt. Vernon	7.2	9.7	....	9.1	7.1	8.7
Plattsburg	7.8	9.8	....	9.6	7.6	9.1
Rochester	8.4	10.4	7.9	9.9	7.9	9.4
Syracuse	8.2	10.2	7.8	9.8	7.8	9.3
Conn.:						
Bridgeport	7.3	9.3	....	....	7.2	8.5
Danbury	7.8	9.8	....	....	7.5	8.5
Hartford	7.4	9.4	....	9.2	7.2	8.7
New Haven	7.1	9.1	....	9	7	8.6
Maine:						
Bangor	7.6	9.6	7.4	9.4	7.4	8.8
Portland	7.2	9.6	7	9	7	8.7
Mass.:						
Boston	7.3	9.5	6.9	8.9	7.1	8.7
N. H.:						
Concord	8.1	10.1	....	....	8.2	9.7
Lancaster	9.2	11.2	....	....	9.2	10.7
Manchester	8.2	10.5	....	....	7.9	9.4
R. I.:						
Providence	7.3	9.3	6.9	8.9	7.1	8.6
Vermont:						
Burlington	7.8	9.8	7.5	9.5	7.5	8.9
Rutland	8	10	....	9.7	7.7	9.2

*Does not include 1% city sales tax applicable to price of gasoline (ex tax).

†In steel barrels.

Discounts: Diesel—On t.w. deliveries, 0.5c for at least 400 gals.; 1c for full tank truck.

Atlantic Refining

Atlantic White Flash Gasoline (*Regular Grade*)*

	Commercial T.W.	Dealer T.W.	Gaso-line Taxes	Kero-sine T.W.
Philadelphia, Pa.	10.2	10.7	5.5	11.65
Pittsburgh	10.7	11.2	5.5	12
Allentown	10.7	11.2	5.5	12
Erie	10.7	11.2	5.5	12
Scranton	10.7	11.2	5.5	12
Altoona	10.7	11.2	5.5	12
Emporium	10.7	11.2	5.5	12
Indiana	10.7	11.2	5.5	12
Uniontown	10.7	11.2	5.5	12
Harrisburg	10.7	11.2	5.5	12
Williamsport	10.7	11.2	5.5	12
Dover, Del.	....	11.2	5.5	12
Wilmington, Del.	....	10.7	5.5	11.5
Boston, Mass.	....	10.9	4.5	9.5
Springfield, Mass.	....	11.8	4.5	10.4
Worcester, Mass.	....	11.5	4.5	10
Fall River, Mass.	....	11	4.5	10.1
Hartford, Conn.	....	11.6	4.5	9.4
New Haven, Conn.	....	11	4.5	10.5
Providence, R. I.	....	11	4.5	10.1
Atlantic City, N. J.	....	10.7	4.5	9.4
Camden, N. J.	....	10.7	4.5	9.4
Trenton, N. J.	....	10.7	4.5	9.4
Annapolis, Md.	....	11.05	5.5	10.2
Baltimore, Md.	....	10.45	5.5	9.2
Hagerstown, Md.	....	11.55	5.5	9.7
Richmond, Va.	....	11.25	6.5	11.7
Wilmington, N. C.	....	11.55	7.5	11.3
Brunswick, Ga.	....	10.4	7.5	*10.5
Jacksonville, Fla.	....	10.4	8.5	11.5

	Mineral Spirits T.W.†	V.M.&P. T.W.†
Philadelphia, Pa.	11	12.5
Lancaster, Pa.	12	13.5
Pittsburgh, Pa.	12.5	13.5

Fuel Oils—T.W.	1	2	3	5	6
Phila., Pa.	9.5	8.7	8.7	5.46	4.46
Allentown, Pa.	10	9	9	....	....
Wilmington, Del.	9.5	8.7	8.7	....	....
Springfield, Mass.	10.4	9.1	9.1	....	....
Worcester, Mass.	10	9	9	....	....
Hartford, Conn.	9.4	8.7	8.7	....	....

*Does not include 1c Georgia kerosine tax.

†Mineral Spirits prices also apply to Stoddard Solvent; V.M.&P. prices also apply to Light Cleaners Naphtha.

Discounts:

Gasoline—to undivided dealers, 0.5c off dealer t.w., except Georgia & Florida dealer t.w. and undivided dealer t.w. prices are same.

Kerosine—Thru Penna. & Delaware, 2c off t.w. price on t.w. deliveries of 25 gals. or more at one time.

S. O. Ohio††

***Sohio X-70 Gasoline (*Regular Grade*)**

	Con-sumer T.W.	**Re-sel-lers	‡S.S.	Gaso-line Taxes	†Kero-sine T.W.
Ohio, Statewide	12	10	13.5	5.5	9
Akron	12	9.5	12.5	5.5	9
Cincinnati	12	9.5	12.5	5.5	9
Cleveland	12	9.5	12.5	5.5	9
Columbus	12	9.5	12.5	5.5	9
Dayton	12	9.5	12.5	5.5	9
Marietta	12	9.5	12.5	5.5	9
Portsmouth	12	9.5	12.5	5.5	9
Toledo	12	9.5	12.5	5.5	9
Youngstown	12	9.5	12.5	5.5	9

Aviation Gasoline—Statewide

	Consumer T.W.	Gasoline Taxes
Sohio aviation grade 65 octane, Spec. AN-VV-F-756	14.5	5.5
Esso Ethyl Aviation 73 Oct.	15.5	5.5
Esso Ethyl Aviation 80 Oct.	16.5	5.5
Esso Ethyl Aviation 91 Oct.	17.5	5.5
Esso Ethyl Aviation 100 Oct.	24.5	5.5

†Naphtha—T.W.

	State-wide	Lucas County
S. R. Solvent	13.5	13.5
D. C. Naphtha	14.5	14.25
V.M.&P. Naphtha	14.5	14.25
Varnolene	14.5	14.25
Sohio Solvent	14.5	14.25

Fuel Oils—T.W.	No. 1	No. 2	No. 3	No. 4
Ohio, Statewide	8	8	7.5	....
Cleveland	10	10	9.5	7.25

*Renown (third-grade) prices are same as X-70 unless otherwise noted.

**Except authorized agents.

†Kerosine prices are ex 1c state tax. Naphtha prices are ex 1.5c federal & 4c state tax.

‡Prices at company-operated stations.

††Statewide prices are subject to exceptions other than those shown.

Discounts:

Esso aviation—on contract to hangar operators and resellers, 2c off consumer t.w.

Fuel oils—Statewide prices are for t.w. & drum deliveries of 50 gals. or more; prices for deliveries of less than 50 gals. are 0.5c higher. Cleveland Nos. 1, 2, and 3 prices are for bulk deliveries of 5 to 99 gals.; 100 gals. and over are 2c less. Cleveland No. 4 price is for full compartment hose dump only.

Naphthas—to contract consumers off t.w. prices—Statewide: 300 to 999 gals., 0.5c; 1000 to 2499 gals., 0.75c; 2500 to 4999 gals., 1c; 5000 or more gals., 1.5c. Lucas County: Less than 50 gals., tank wagon price; 50 to 249 gals., 0.5c; 250 to 499 gals., 1c; 500 gals or over, 1.5c.

S. O. Kentucky

Crown Gasoline (*Regular*)
Standard (*Third Grade*)

	†Net Dealer Crown	Standard	Gaso-line Taxes	Kero-sine T.W.
Covington, Ky.	9.5	8.5	6.5	9
Lexington, Ky.	10.5	8.5	6.5	9
Louisville, Ky.	10	9	6.5	8.5
Paducah, Ky.	9	8	6.5	8.5
Jackson, Miss.	10	9	7.5	*8.5
Vicksburg, Miss.	9.5	8.5	7.5	*8
Birmingham, Ala.	10	9	*8.5	9
Mobile, Ala.	9	7	*9.5	8.5
Montgomery, Ala.	10	9	*9.5	*9
Atlanta, Ga.	13.9	....	7.5	*11.4
Augusta, Ga.	13.9	....	7.5	*10.9
Macon, Ga.	13.9	....	7.5	*11.4
Savannah, Ga.	12.9	....	7.5	*10.4
Jacksonville, Fla.	12.9	....	8.5	10.4
Miami, Fla.	12.9	....	8.5	10.4
Pensacola, Fla.	9	8	*9.5	8
Tampa, Fla.	12.9	....	8.5	10.4

*Taxes: In tax column are included these city and county gasoline taxes: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Montgomery, Ala. have 1c kerosine tax. Mississippi 0.5c, not included in above prices.

†Consumer t.w. prices are same as net dealer prices.

S. O. Indiana

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)
Dealer Prices

	Red Crown Cons. T.W	Red Crown	Blue Crown	Gaso-line Taxes	Kero-sine T.W.
Chicago, Ill.	10.9	8.9	8.4	4.5	10.3
Decatur, Ill.	9.1	7.1	7.1	4.5	9.5
Joliet, Ill.	11.9	9.6	8.5	4.5	10.3

(Continued on next page)

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified, per gallon:

Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1.8c; Illinois 3/100c; Indiana 1.5c in lots of 25 bbls. or less, 2/25c in lots of more than 24 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2.5c; and Wisconsin 3/100c.

Kerosine inspection fees only: Iowa 3/50c; Michigan 1.5c per gal.

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes:** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes: also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect Aug. 24, 1942 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. Indiana (Cont'd)

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)
Dealer Prices

	Red Crown Cons. T.W.	Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Peoria, Ill.	10.7	9.2	9.1	4.5	10.1
Quincy, Ill.	8.9	7.9	7.9	4.5	10
Indianapolis, Ind.	11.6	9.7	9.6	5.5	*9.8
Evansville, Ind.	11.4	9.9	7.9	5.5	*9.6
South Bend, Ind.	12	10.2	10	5.5	†10.2
Detroit, Mich.	11.4	9.9	9.4	4.5	9.6
Grand Rapids, Mich.	9.6	8.1	8.1	4.5	9.6
Saginaw, Mich.	11.4	9.9	9.4	4.5	9.6
Green Bay, Wis.	12.2	10.7	9.7	5.5	10.6
Milwaukee, Wis.	12.1	10.6	10.1	5.5	10.5
La Crosse, Wis.	11.9	10.4	9.9	5.5	10.3
Minneapolis-St. Paul	11.9	9.9	9.5	5.5	10.3
Duluth, Minn.	12.2	10.7	10.2	5.5	10.6
Mankato, Minn.	11.9	10.4	9.5	5.5	10.3
Des Moines, Ia.	11.4	9.9	9.4	4.5	*9.8
Davenport, Ia.	11.7	10.2	9.7	4.5	*10.1
Mason City, Ia.	11.7	10.2	9.7	4.5	*10.1
St. Louis, Mo.	10.3	8.8	8.6	*4.5	9.8
Kansas City, Mo.	10.4	8.9	7.9	*4.5	9.4
St. Joseph, Mo.	9	9	8	*4.5	9.4
Fargo, N. D.	12.9	11.4	10.5	5.5	11.3
Huron, S. D.	12.3	10.8	10.3	5.5	10.7
Wichita, Kans.	10.3	8.2	6.5	4.5	8

Stanavo Aviation 73 Octane

Chicago, Ill.	15.7	4.5
Milwaukee, Wis.	15.9	5.5
Minneapolis, Minn.	15.7	5.5
St. Louis, Mo.	15.2	*4.5
Kansas City, Mo.	14.8	*4.5
Fargo, N. D.	16.7	5.5
Huron, S. D.	16.1	5.5

(Prices are base prices before discounts)

	Oleum Spirits	V.M.&P. Naphtha	Stanisol	*Taxes
Chicago	13.5	13.8	12.8	4.5
Detroit	15.8	15	16.3	4.5
K. C., Mo.	13.3	14.3	13.8	1.5
St. Louis, Mo.	13.7	14.7	13.2	1.5
Milwaukee	14.4	15.4	14.9	5.5
Minneap'ls	14.2	15.2	13.5	5.5

Fuel Oils T.W.
Chicago

	Standard	Heater Oil
1-99 gals.		9
100-149 gals.		8
150 gals. & over		7.5

	Stanolex Fuel Oil No. 1	Stanolex Furnace Oil
1-99 gals.	8.5	8.5
100-149 gals.	7.5	7.5
150-399 gals.	7.5	7.5
400 gals. & over	7	7

	Stanolex Fuel Oil A	Stanolex Fuel Oil B
1-99 gals.	8	8
100-399 gals.	7	7
400-749 gals.	6	6
750 gals. & over	5.25	5.25

	Stanolex Bunker C Fuel Oil
1-399 gals.	6.5
400-999 gals.	5.5
1000 gals. & over	4.5

Other Points Indianapolis	Stanolex No. 1	Stanolex Furnace Oil
1-99 gals.	....	*8.7
100 gals. & over	....	*7.7
Detroit		
1-99 gals.	....	7.8
100 gals. & over	....	6.8
Milwaukee		
1-99 gals.	....	8.7
100 gals. & over	....	7.7
Minneapolis		
1-99 gals.	....	8.5
100 gals. & over	....	7.5
St. Louis		
1-99 gals.	8.3	7.8
100 gals. & over	7.3	6.8
Kansas City		
1-99 gals.	....	7.6
100 gals. & over	....	6.6

*Taxes: In gasoline tax column are included these city taxes—Kansas City, St. Joseph, and St. Louis, 1c. Indiana kerosine and fuel oil prices are ex 4c state tax; Iowa kerosine prices are ex 3c state tax. In naphtha tax column are included 1.5c federal tax and state taxes.

S. O. Nebraska

(*Regular Grade*)

	T.W. Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Omaha	11.4	8.9	6.5	9.8
McCook	10.5	9.4	6.5	9
Norfolk	11.9	10.4	6.5	10.3
North Platte	11	9.9	6.5	10
Scottsbluff	12.4	9.5	6.5	9.5

S. O. Louisiana

Esso Gasoline (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
New Orleans, La.	8.75	9.25	8.5	*9
Baton Rouge, La.	8.75	9.25	8.5	*9.5
Alexandria, La.	8.75	9.25	8.5	*9.5
Lafayette, La.	9	9.5	8.5	*9
Lake Charles, La.	9	9.5	8.5	*11
Shreveport, La.	8.5	9	8.5	*8
Knoxville, Tenn.	9.5	10	8.5	12.5
Memphis, Tenn.	7.90	8.40	8.5	10.5
Chattanooga, Tenn.	10.5	11	8.5	11
Nashville, Tenn.	10.5	11	8.5	10
Bristol, Tenn.	10.95	11.45	8.5	13.1
Little Rock, Ark.	9.5	10	8	10

*Louisiana kerosine prices are ex 1c state tax.
Discounts:
Esso Gasoline—To undivided dealers, 0.5c off dealer t.w.

Humble Oil & Refining Co.

Humble Motor Fuel (*Regular Grade*)
Thriftane (*Third Grade*)

	Humble *Tank Wagon	Humble Re-tail	Thriftane *Tank Wagon	Thriftane Re-tail	Gasoline Taxes
Dallas, Tex.	7.5†	7.5	6.5††	6.5	5.5
Ft. Worth, Tex.	8.5††	10.5	7.5‡	9	5.5
Houston, Tex.	8.5	12.5	7.5	10.5	5.5
San Antonio, Tex.	8.5	12.5	7.5	10.5	5.5

	Kerosine *Tank Wagon	Kerosine Retail
Dallas, Tex.	7	11
Ft. Worth, Tex.	7	11
Houston, Tex.	8	11
San Antonio, Tex.		10

	Tank Car
74 Oct. Aviation Gasoline, Clear FOB Baytown, Tex.	8.5

*To all classes of dealers & consumers.
‡Less 1½c allowance to dealers only.
††Less 2c allowance to dealers only.
†Less 2½c allowance to dealers only.

The Texas Co.

	Gasoline—Dealer T.W. Fire-Chief (*Regular*)	Indian (*3rd Grade*)	Gasoline Taxes
Dallas, Tex.	6.5‡	5.5†	5.5
Ft. Worth, Tex.	8.5†	7.5**	5.5
Wichita Falls, Tex.	8.5	7.5	5.5
Amarillo, Tex.	8.5	7.5	5.5
Tyler, Tex.	8.5*	7.5*	5.5
El Paso, Tex.	9.5	8.5	5.5
San Angelo, Tex.	8.5	7.5	5.5
Waco, Tex.	8*	7*	5.5
Austin, Tex.	8.5	7.5	5.5
Houston, Tex.	8.5	7.5	5.5
San Antonio, Tex.	8.5	7.5	5.5
Port Arthur, Tex.	8.5	7.5	5.5

*Less 1c temporary allowance to all dealers.
**Less 1.5c temporary allowance to all dealers.
†Less 2c temporary allowance to all dealers.
‡Less 2½c temporary allowance to all dealers.

Continental Oil Co.

(N.B. Prices are Continental's "structural" prices. Prices do not reflect temporary reductions made to meet local competition.)

	Conoco Bronz-z-z (*Regular*) †Tank Wagon	Demand (*3rd Grade*) Wagon	Gasoline Taxes	Kerosine T.W.
Denver, Col.	11	10	5.5	11
Grand Junction, Col.	12	11	5.5	12
Pueblo, Col.	10.5	9.5	5.5	10.5
Casper, Wyo.	11.5	10.5	5.5	12
Cheyenne, Wyo.	11	10	5.5	11.5
Billings, Mont.	12.5	11.5	6.5	12.5
Butte, Mont.	13.5	12.5	6.5	13.5
Great Falls, Mont.	12.5	11.5	6.5	12.5
Helena, Mont.	13	12	6.5	13
Salt Lake City, Utah	13.5	12.5	5.5	14.5
Boise, Ida.	14.1	13.1	6.5	16.5
Twin Falls, Ida.	15.6	14.6	6.5	17
Albuquerque, N. M.	10.5	9.5	*7	10
Roswell, N. M.	10	9	*7	9.5
Santa Fe, N. M.	10.5	9.5	*7.5	10
Ft. Smith, Ark.	9.5	9.25	*7	9.5
Texarkana, Ark.	9	8	*5.5	9
Muskogee, Okla.	9.5	8.5	7	8.5
Oklahoma City, Okla.	9.5	8.5	7	8.5
Tulsa, Okla.	9.5	8.5	7	8.5

*Taxes: In gasoline tax column are included these city taxes—Albuquerque, & Roswell, 0.5c; Santa Fe, 1c. Texas 4c state tax applies within city limits of Texarkana, Ark.; Okla. 5.5c state applies within city limits of Ft. Smith, Ark.
†To consumers & dealers.

S. O. California

Standard Gasoline (*Regular Grade*)
Flight Gasoline (*Third Grade*)

	Standard Posted Net Tank Truck	Standard Re-tail	Flight Posted Net Tank Truck	Flight Re-tail	Gasoline Taxes
San Francisco, Cal.	10	14	9	12	4.5
Los Angeles, Cal.	9.5	13.5	8.5	11.5	4.5
Fresno, Cal.	11	15	10	13	4.5
Phoenix, Ariz.	12	16	10	13	6.5
Reno, Nev.	12	16	11	14	5.5
Portland, Ore.	10.5	14.5	9.5	12.5	6.5
Seattle, Wash.	10.5	14.5	9.5	12.5	6.5
Spokane, Wash.	12.5	16.5	11.5	14.5	6.5
Tacoma, Wash.	10.5	14.5	9.5	12.5	6.5

Std. Aviation 73

	Posted Net Tank Truck	Gasoline Taxes	Kerosine Tank Truck
San Francisco, Cal.	12.5	4.5	11.5
Los Angeles, Cal.	12	4.5	10
Fresno, Cal.	13.5	4.5	12.5
Phoenix, Ariz.	14.5	6.5	12.5
Reno, Nev.	14.5	5.5	13.5
Portland, Ore.	13	6.5	13.5
Seattle, Wash.	13	6.5	13.5
Spokane, Wash.	16	6.5	16.5
Tacoma, Wash.	13	6.5	13.5

Resale & Commercial: T.C. deliveries 0.25c per gal. off posted net tank truck.
Commercial: Retail deliveries, and/or tank truck deliveries of less than 40 gals., 4c per gal. above posted net tank truck price for Standard Aviation and Standard Gasoline, and 3c per gal. above posted net tank truck for Flight Gasoline, except similar deliveries of less than 40 gals. to Marine trade only, which are billed at posted net tank truck price.

Canada

PRICES ON IMPERIAL OIL, LTD.
Per Imperial Gallon, which is 1.2 U. S. Gallons
3-Star Imperial Gasoline (*Regular Grade*)

	†Gasoline T.W.	*Gasoline Taxes	†Kerosine T.W.
Hamilton, Ont.	17.5	11	18
Toronto, Ont.	17.5	11	18
Brandon, Man.	21	10	23
Winnipeg, Man.	20.5	10	22.5
Regina, Sask.	18	10	20
Saskatoon, Sask.	20.8	10	22.8
Edmonton, Alta.	18.9	10	20.9
Calgary, Alta.	16	10	18
Vancouver, B. C.	15	10	24
Montreal, Que.	17	11	17.5
St. John, N. B.	16.5	13	19
Halifax, N. S.	16.5	13	19

*Includes 3c Federal, and Provincial taxes.
†To divided & undivided dealers.

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified, per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/10c; Indiana 1/5c in lots of 25 bbls. or less, 2.25c in lots of more than 25 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/10c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/10c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

CRUDE OIL PRICES

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates shown

EASTERN & CENTRAL STATES FIELDS

PENNSYLVANIA GRADE

Posted by Jos. Seep Purch. Agency (Mar. 26, '42)

Bradford-Allegany	$3.00
Southwest Penna.	$2.65
Eureka (West Va.)	$2.59
Corning, O. (May 27, '41)	$1.31

Posted by The Pennzoil Co. (Mar. 26, '41)

National Transit	$2.93*

Posted by Valvoline Pipe Lines (Mar. 26, '42)

Bradford (Elk & McKean Counties, (Pa.)	$3.00
Warren, Forest, Venango, Clarion & Butler Counties, Pa.	$2.93
Alleghany, Beaver, Washington & Greene Counties, Pa.	$2.65
West Virginia	$2.59
Southeastern Ohio	$2.55

*Applies to Cochran, Franklin, Hamilton & Doolittle districts; prices in other lower districts range down to $2.88 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co. (May 27, '41)

Midland, Midland County	$1.44
Sherman	$1.39

Posted by Simrall Corp. (May 27, '41)

Greendale, Porter, Vernon, Crystal & Wise	$1.44
Buckeye, Bentley, Edenville, Beaverton & Monitor (sweet crude type)	$1.42
Freeman, Redding, Lincoln & Winterfield	$1.39
West Branch-Arenac	$1.24
Hamilton-Grout	$1.29

Posted by Sohio Corp. (Mich. Div.)

Traverse crude in Allegan, Kent, Ottawa & Van Buren Cos. (June 2, '41)	$1.45
Trenton crude, Monroe Co. (June 2, '41)	$1.39

Posted by Bay Pipe Line Corp. (May 27, '41)

Saginaw & Wise	$1.44	Buckeye, Bentley & Kawkawlin	$1.42
Clare	$1.11	Adams (June 1, '41)	$1.27

ILLINOIS-INDIANA-KENTUCKY-OHIO

Posted by Sohio Corp. (May 21, '41)

Illinois Basin, including Griffin pool	$1.37
Carmi, Storms, Ill. area	$1.32
Birk City, Ky. area	$1.32
Corydon, Ky. area, Henderson	$1.32

Posted by Ohio Oil Co. (May 21, '41)

Illinois Basin	$1.37
Eastern Ill. & Western Ind.	$1.22

Posted by Carter Oil Co. (May 21, '41)

Loudon, Fayette Co. Ill.	$1.37

Posted by Mohawk Oil Lines, Inc. (May 21, '41)

Southern Illinois	$1.37

Posted by Ashland Oil & Transp. Co.

Somerset oil in Ash. Lines, Ky.; (June 19, '41)

Big Sandy River	$1.38	Kentucky River	$1.43

Posted by Ownesboro-Ashland Co.

Owensboro, Ky. area (May 21, '41)	$1.32

Posted by S. O. Ohio (Sept. 1, '41)

Lima, Ohio	$1.25
Cleveland, Lodi & Chatham (O). areas	$1.30

MID-CONTINENT

OKLAHOMA-KANSAS-NORTH TEXAS

(See below for companies posting and dates)

Gravity	Schedule No. 1	Schedule No. 2	Schedule No. 3
Below 21	$0.85	$0.75	$0.81
21-21.9	.87	.78	.83
22-22.9	.89	.81	.85
23-23.9	.91	.84	.87
24-24.9	.93	.87	.89
25-25.9	.95	.90	.91
26-26.9	.97	.93	.93
27-27.9	.99	.96	.95
28-28.9	1.01	.99	.97
29-29.9	1.03	1.02	.99
30-30.9	1.05	1.05	1.01
31-31.9	1.07	1.07	1.03
32-32.9	1.09	1.09	1.05
33-33.9	1.11	1.11	1.07
34-34.9	1.13	1.13	1.09
35-35.9	1.15	1.15	1.11
36-36.9	1.17	1.17	1.13
37-37.9	1.19	1.19	1.15
38-38.9	1.21	1.21	1.17
39-39.9	1.23	1.23	1.19
40 & above	1.25	1.25	1.21

Above schedules posted by:

No. 1: **S. O. Indiana** May 20, '41 in Okla. & Kans. **Sinclair-Prairie** May 20, '41 in Okla. & Kans. beginning with 25-25.9. **Continental** May 19, '41 in Okla. & Kans. beginning with Below 29 at $1.01. **Texaco** May 19, in Okla. & Kans. beginning with 28-28.9.

No. 2: **Carter** May 20, '41 in Okla. **Shell** Dec. 5, '41 in Okla. & Kans. **Magnolia** May 21, '41 in Okla.

No. 3: All Dec. 11, '41: **Stanolind & Continental** in N. Tex. **Sinclair-Prairie** in N. Central Tex. **Magnolia & Texaco** in N. & N. Central Tex. **Continental, Magnolia & Sinclair-Prairie** schedules begin with Below 29 at $0.97. **Texaco** schedule begins with 28-28.9.

TEXAS & NEW MEXICO FIELDS

Posted by Humble Oil & Refining Co.

(May 21, '41, except Panhandle, Tex. July, 9 '41 and W. Central Texas Dec. 11, '41)

Gravity	Refugio	Texas Gulf Coast	Miran-do	Ana-huac	Dick-inson	East Central Texas	West Central Texas	Pan-handle, Texas	W. Texas & New Mex.	Hawkins Texas
Below 20	$1.08	$1.06	$1.03	$0.98	$0.93	....	....	$0.73	$0.70	$0.80
20-20.9	1.10	1.08	1.05	1.00	.95	....	....	.75	.72	.82
21-21.9	1.12	1.10	1.07	1.02	.97	....	....	.77	.74	.84
22-22.9	1.14	1.12	1.09	1.04	.99	....	....	.79	.76	.86
23-23.9	1.16	1.14	1.11	1.06	1.01	....	....	.81	.78	.88
24-24.9	1.18	1.16	1.13	1.08	1.03	....	....	.83	.80	.90
25 & above	....	....	....	....	....	....	....	....	....	.92
25-25.9	1.20	1.18	1.15	1.10	1.05	$0.97	$0.91	.85	.82	....
26-26.9	1.22	1.20	1.17	1.12	1.07	.99	.93	.87	.84	....
27-27.9	1.24	1.22	1.19	1.14	1.09	1.01	.95	.89	.86	....
28-28.9	1.26	1.24	1.21	1.16	1.11	1.03	.97	.91	.88	....
29-29.9	1.28	1.26	1.23	1.18	1.13	1.05	.99	.93	.90	....
30-30.9	1.30	1.28	1.25	1.20	1.15	1.07	1.01	.95	.92	....
31-31.9	1.32	1.30	1.27	1.22	1.17	1.09	1.03	.97	.94	....
32-32.9	1.34	1.32	1.29	1.24	1.19	1.11	1.05	.99	.96	....
33-33.9	1.36	1.34	1.31	1.26	1.21	1.13	1.07	1.01	.98	....
34-34.9	1.38	1.36	1.33	1.28	1.23	1.15	1.09	1.03	1.00	....
35-35.9	1.40	1.38	1.35	1.30	1.25	1.17	1.11	1.05	1.02	....
36-36.9	1.42	1.40	1.37	1.32	1.27	1.19	1.13	1.07	1.04	....
37-37.9	1.44	1.42	1.39	1.34	1.29	1.21	1.15	1.09	1.06	....
38-38.9	1.46	1.44	1.41	1.36	1.31	1.23	1.17	1.11	1.08	....
39-39.9	1.48	1.46	1.43	1.38	1.33	1.25	1.19	1.13	1.10	....
40 & above	1.50	1.48	1.45	1.40	1.35	1.27	1.21	1.15	1.12	....

Refugio: Includes crude purchased in East White Point, Greta, Melon Creek, O'Connor-McFaddin, Plymouth, Saxet, Taft, & Tom O'Connor fields.

Texas Gulf Coast: Includes crude purchased in Amelia, Clear Lake, Goose Creek, Hastings, Magnet, Mykawa, Mykawa New, Raccoon Bend, South Thompsons, Sugarland, Thompsons, & Webster fields.

Mirando: Includes crude purchased in Blanchard, Bridwell, Colorado, Comitas, Eagle Hill, Escobas, Fitzsimmons, Glen, Government Wells (North & South), Heyser, Hoffman, Kelsey, Kohler, Loma Novia, Lundell, Manilla, Mirando Valley, Placedo, Randado, Sarnosa, & Tesoro fields.

Anahuac: Includes crude purchased in Anahuac, Angleton, Cedar Point, Fishers' Reef, Hull, (Old & New), Pierce Junction, Red Fish Reef, & Turtle Bay fields.

Dickinson: Includes crude purchased in Dickinson, Gillock, Hardin, League City, & Rowan fields.

East Central Texas: Includes crude purchased in Anderson, Cherokee, Limestone, & Navarro Counties, and Navarro Crossing field.

West Central Texas: Includes crude purchased in Brown, Callahan, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, & Throckmorton Counties.

Panhandle, Texas: Includes crude purchased in Carson, Gray, Hutchinson & Wheeler Counties.

West Texas & New Mexico: Includes crude purchased in Andrews, Crane, Crockett, Ector, Gaines, Glasscock, Howard, Reagan, Upton, Winkler, & Yoakum Counties, Texas; Lea County, N. M.

Hawkins: Includes crude purchased in Hawkins Field, Wood County, Texas.

Conroe	$1.43	**East Texas & Flag Lake**	$1.25	**Clark, Zoboroski**	$1.14
Tomball	1.40	**Flour Bluff, E. Flour Bluff**	1.33	**Alice, Benavides (N. Sweden), Sun**	1.35
Van	1.08	**Salt Flat, N. Salt Flat**	1.14	**Ben Bolt, Clark-Muil, Tom Graham**	1.35
Talco	0.79	**Darst Creek, Hilbig, Carroll**	1.14	**Yates (Pecos)**	0.95
				La Rosa	1.33

MAGNOLIA PETROLEUM CO.

(May 21, '41)

Panhandle, Tex.—(July 9, '41)—Same as Humble except Magnolia begins with below 29 at $0.91.

West Texas—In Crane, Upton, Howard, Glasscock, Mitchell, Winkler, Cochran, Hockley, Yoakum & Gaines Cos., and in Pecos & Andrews Cos. beginning Apr. 1, '42—Same as Humble except Magnolia begins with Below 25 at $0.80.

N. Mexico—In Lea Co.—Same as Humble except Magnolia begins with Below 25 at $0.88 & ends with 36 & above at $1.04.

Cass & Panola Cos., Tex.—Below 25 at $0.88, plus 2c per degree of gravity to 40 & above at $1.20.

Mirando, Tex.—Same as Humble.

East Texas	$1.25	**Lytton Springs**	$1.17
Darst Creek	1.14	**Cleveland-Liberty Co.**	1.26
Luling	1.05	**Tomball**	1.40
Talco	.79		

SINCLAIR-PRAIRIE OIL MARKETING CO.

Texas Panhandle—(May 23, '41)—Same as Humble except Sinclair-Prairie begins with Below 25 at $0.83.

West Texas & New Mexico—(May 30, '41)—Same as Humble except Sinclair-Prairie begins with Below 25 at $0.80.

Texas Gulf Coast—(May 21, '41)—Same as Humble.

Mexia District, Texas—(May 30, '41)—Same as Humble, East Central Texas, except Sinclair-Prairie also posts Below 25 at $0.95.

East Texas—(May 21, '41)	$1.25
Long Lake, Texas—(May 21, '41)	$1.23
Chapel Hill (Washington Co.) Tex.:	
Below 50 grav. (Jan 20, '42)	$1.18
50 grav. & above (Feb. 2, '42)	$1.25

STANOLIND OIL PURCHASING CO.

(May 21, '41)

Clinton, Tex.—Same as Humble Tex. Gulf Coast except Stanolind begins with Below 21 at $1.08.

Fairbanks, N. Houston & Rosslyn, Tex.—Same as Humble Dickinson schedule.

Lake Creek, Tex.—(Apr. 9, '42)—Same as Humble Tex. Gulf Coast except Stanolind begins with Below 21 at $1.08.

E. Texas $1.25 **Satsuma & Tomball, Tex.** $1.40

Eureka Heights (Harris Co.)—Aug. 1, '42 $1.15

STANOLIND OIL & GAS CO.

(May 21, '41)

W. Beaumont & Spindletop (Jefferson Co., Tex.) **& Highland Island** (Galveston Co., Tex.)—Same as Humble Tex. Gulf Coast.

Hendrick & Henderson (Winkler Co., Tex.)—Same as Humble West Texas except Stanolind begins with Below 26 at $0.82.

Jay Welder (Calhoun Co., Tex.)—Nov. 14, '41—Same as Humble Anahuac.

Spencer & Pyote (Ward Co., Tex.)—June 8, '42—Same as Humble W. Texas.

Magnolia Sealey South (Ward Co., Tex.)—June 8, '42—Same as Humble W. Texas except Stanolind ends with 36 & above at $1.04.

THE TEXAS CO.

(May 21 '41)

Panhandle, Tex.—Same as Humble except Texaco begins with 34-34.9 at $1.03.

W. Texas & Lea Co., N. M.—Same as Humble except Texaco posts $0.78 for 23.9 & below and ends with 36 & above at $1.04.

Texas Gulf Coast—Same as Humble except Texaco ends with 34 & above at $1.36.

Duval, Mirando, Tex.—Same as Humble Mirando except Texaco ends with 28-28.9 at $1.21.

Refugio, Tex.—Same as Humble except Texaco ends with 28-28.9 at $1.26.

East Texas	$1.25	**Conroe, Tex.**	$1.43
Darst Creek, Tex.	$1.14	**Hockley & Cochran Cos., Tex.**	.87

SHELL OIL CO., INC.

(May 20, '41)

West Texas & Lea Co., N. M.—Same as Humble except Shell ends with 36 & above at $1.04.

Fisher Co., Tex.—(Dec. 11, '41)—Same as Humble W. Central Texas except Shell begins with Below 25 at $0.89.

East Texas	$1.25
Livingston field, Polk Co., Tex.	$1.25
Pecos Co., Texas, (except Yates Shallow Pool)	.95
Pecos Co., Tex., Yates Shallow Pool	.82
Mercy field, San Jacinto Co., Tex. (Feb. 27, '42)	1.25

CONTINENTAL OIL CO.

Carson & Hutchinson Cos., Tex.—(July 9, '41)—Same as Humble Panhandle except Continental begins with Below 29 at $0.91.

Mirando, Tex.—(July 1, '41—Same as Humble.

Wade City & Clara Driscoll, Tex.—(July 1, '41)—Same as Humble Refugio.

Alfred & Magnolia City, Tex.—(May 21, '41), $1.35

Eddy Co., N.M.—(May 30, '41)—Same as Humble N. M. schedule except Continental begins with Below 29 at $0.88.

PAN AMERICAN PRODUCTION CO.

(May 21, '41)

Hastings & S. Houston, Tex.—Same as Humble Tex. Gulf Coast except Pan Am. begins with Below 21 at $1.08.

Gillock, Tex.—Same as Humble Dickinson except Pan Am. begins with Below 21 at $0.95.

East Texas	$1.25
Cayuga, Tex.	.90
Goodrich, Tex. (Dec. 1, '41)	1.20

CRUDE OIL PRICES

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates shown.

CALIFORNIA

Posted by S. O. California, May 23, 1941

(All gravities above those quoted take highest price offered in that field)

Gravity	Signal Hill (Long Beach)	Wilmington	El Segundo	Seal Beach	Huntington Beach	Inglewood	Olinda Brea Canon	Athens-Rosecrans	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Greeley, Canal, Wasco	Coles Levee	Mountain View	Elk Hills, Buena Vista Hills, Midway-Sunset, Lakeview Area	Lost Hills	Coalinga	Gravity
14-14.9	....	$0.68	....	....	$0.71	....	$0.70	....	$0.70	$0.70	$0.70	$0.72	....	....	....	....	....	$0.73	$0.73	$0.73	14-14.9
15-15.9	....	.71	....	....	.75	$0.76	.72	....	.72	.71	.72	.72	....	....	....	....	....	.73	.73	.73	15-15.9
16-16.9	....	.74	$0.79	....	.79	.79	.75	....	.74	.73	.75	.72	....	....	....	....	....	.73	.75	.73	16-16.9
17-17.9	....	.78	.82	....	.82	.82	.78	....	.77	.76	.78	.72	....	....	....	....	....	.75	.78	.73	17-17.9
18-18.9	$0.80	.82	.86	....	.86	.85	.81	....	.80	.79	.82	.74	....	....	....	....	....	.78	.81	.73	18-18.9
19-19.9	.84	.86	.90	....	.89	.88	.85	....	.83	.82	.85	.77	....	....	....	....	$0.73	.81	.84	.75	19-19.9
20-20.9	.88	.90	.94	....	.93	.92	.88	....	.86	.85	.89	.80	....	....	....	....	.76	.85	.87	.77	20-20.9
21-21.9	.92	.94	.98	....	.96	.95	.91	....	.89	.89	.92	.84	....	....	....	....	.79	.90	.90	.80	21-21.9
22-22.9	.96	.98	1.02	$0.88	.99	.98	.95	....	.93	.93	.96	.87	....	....	....	....	.83	.94	.93	.83	22-22.9
23-23.9	1.00	1.02	1.05	.92	1.02	1.01	.98	....	.97	.98	1.00	.91	....	....	....	....	.87	.99	.96	.86	23-23.9
24-24.9	1.03	1.06	1.07	.97	1.05	1.04	1.01	....	1.01	1.02	1.03	.94	$0.99	....	....	....	.90	1.03	.99	.89	24-24.9
25-25.9	1.07	1.09	1.10	1.01	1.08	1.07	1.04	....	1.05	1.06	1.07	.98	1.02	....	....	....	.94	1.07	1.01	.92	25-25.9
26-26.9	1.11	1.12	1.12	1.06	1.11	1.10	1.08	....	1.09	1.10	1.11	1.01	1.06	....	....	....	.97	1.11	1.04	.95	26-26.9
27-27.9	1.15	1.15	1.15	1.10	1.14	1.14	1.11	....	1.13	....	1.15	1.05	1.10	$1.04	....	....	1.01	1.15	1.07	.98	27-27.9
28-28.9	1.18	1.18	1.17	1.15	1.17	1.17	1.14	....	1.17	....	....	1.08	1.13	1.08	....	....	1.04	1.19	1.10	1.00	28-28.9
29-29.9	1.20	1.21	....	1.19	1.20	1.20	....	$1.17	....	....	....	1.12	1.17	1.12	....	....	1.07	1.24	1.13	1.02	29-29.9
30-30.9	1.23	1.24	....	....	1.23	1.22	....	1.21	....	Elwood	....	1.15	1.21	1.15	$1.01	$1.09	1.10	1.28	1.16	1.04	30-30.9
31-31.9	....	....	....	....	....	1.24	....	1.25	....	Terrace	....	1.19	1.24	1.19	1.04	1.12	1.14	....	....	1.06	31-31.9
32-32.9	....	....	....	....	....	....	....	1.29	....	F.o.b. Ship	....	1.23	1.28	1.23	1.07	1.14	1.17	....	....	1.09	32-32.9
33-33.9	....	....	....	....	....	....	....	1.32	....	$1.22	....	1.27	....	1.26	1.10	1.17	....	....	....	1.11	33-33.9
34-34.9	Kettleman Hills		....	....	....	....	....	1.36	....	1.25	....	1.31	....	1.30	1.13	1.20	....	....	....	1.13	34-34.9
35-35.9	....	$1.23	....	....	....	....	....	....	....	1.28	....	1.35	....	....	1.16	1.22	....	....	....	....	35-35.9
36-36.9	....	1.26	....	....	....	....	....	....	....	....	....	1.39	....	....	1.19	1.25	....	....	....	....	36-36.9
37-37.9	....	1.29	....	....	....	....	....	....	....	....	....	1.43	....	....	1.22	....	....	....	....	....	37-37.9
38-38.9	....	....	....	....	....	....	....	....	....	....	....	1.47	....	....	1.25	....	....	....	....	....	38-38.9
39-39.9	....	....	....	....	....	....	....	....	....	....	....	1.51	....	....	....	....	....	....	....	....	39-39.9
40-40.9	....	....	....	....	....	....	....	....	....	....	....	1.53	....	....	....	....	....	....	....	....	40-40.9

Playa Del Rey: (FOB Standard Pipe Line) 20-20.9, $0.80; 21-21.9, $0.84; 22-22.9, $0.87.
Wheeler Ridge: 22-22.9, $0.76; 23-23.9, $0.80; 24-24.9, $0.83.
Newhall, Kern River, Kern Front, McKittrick & Round Mountain: 14-14.9, $0.73.

LOUISIANA-ARKANSAS

Posted by S. O. Louisiana, May 22, '41

Gravity	Atlanta, Ark. et al.	De Soto, La. et al.	Rodessa, La. et al.	Bunkie, La. et al.	Darrow, La. et al.	University, La. (Baton Rouge Shallow Production
40 & Above	$1.08	$1.18	$1.20	$1.30	$1.30	$1.48
39-39.9	1.06	1.16	1.18	1.28	1.28	1.46
38-38.9	1.04	1.14	1.16	1.26	1.26	1.44
37-37.9	1.02	1.12	1.14	1.24	1.24	1.42
36-36.9	1.00	1.10	1.12	1.22	1.22	1.40
35-35.9	.98	1.08	1.10	1.20	1.20	1.38
34-34.9	.96	1.06	1.08	1.18	1.18	1.36
33-33.9	.94	1.04	1.06	1.16	1.16	1.34
32-32.9	.92	1.02	1.04	1.14	1.14	1.32
31-31.9	.90	1.00	1.02	1.12	1.12	1.30
30-30.9	.88	.98	1.00	1.10	1.10	1.28
29-29.9	.86	.96	.98	1.08	1.08	1.26
28-28.9	.84	.94	.96	1.06	1.06	1.24
27-27.9	.82	.92	.94	1.04	1.04	1.22
26-26.9	.80	.90	.92	1.02	1.02	1.20
25-25.9	.78	.88	.90	1.00	1.00	1.18
Below 25	....	.86	.88	.98	....	....
24-24.9	.76	....	.88	....	.98	1.16
23-23.9	.74	....	.86	....	.96	1.14
22-22.9	.72	....	.84	....	.94	1.12
21-21.9	.70	....	.82	....	.92	1.10
Below 21	.68	....	.80	....	.90	....
20-20.9	....	....	....	....	....	1.08
Below 20	....	....	....	....	....	1.06

*Posted July 2, '42.

Atlanta schedule includes Buckner, Lewisville, Magnolia, Village & Schuler (Jones Sand), Ark.

De Soto schedule includes Sabine, Fouke, Homer, Miller co., Nebo & Sugar Creek.

Rodessa schedule includes Cotton Valley & Shreveport (Cross Lake) ending with Below 25 at $0.88; Anse La Butte (Aug. 1, '41); Caddo (Oct. 15, 1941).

Bunkie schedule includes Eola, Olla, South Olla, Pine Prairie (May 21, '42), and University (Baton Rouge) Deep Production (May 22, '42).

Darrow schedule includes Bayou Mallet, Choctaw, Jeanerette, Lirette, N. & S. Crowley, Port Allen, Port Barre, Potash, Roanoke, & St. Martinville.

Big Creek, Dorcheat, McKamie, Distillates (Sour) $1.15
Heavy Smackover Crude ..... .83
Cotton Valley Distillate (Sept. 1, '41) 1.40
Cotton Valley (Holloway Sand Crude) 1.25
Lisbon Distillate 1.20

(Continued next column)

LOUISIANA-ARKANSAS *(Cont'd)*

Posted by Shell Oil Co., Inc. (May 20, '41)

Gravity	Iowa	Roanoke	Gibson
Below 20	$0.99	$0.94	$0.89
20-20.9	1.01	.96	.91
21-21.9	1.03	.98	.93
22-22.9	1.05	1.00	.95
23-23.9	1.07	1.02	.97
24-24.9	1.09	1.04	.99
25-25.9	1.11	1.06	1.01
26-26.9	1.13	1.08	1.03
27-27.9	1.15	1.10	1.05
28-28.9	1.17	1.12	1.07
29-29.9	1.19	1.14	1.09
30-30.9	1.21	1.16	1.11
31-31.9	1.23	1.18	1.13
32-32.9	1.25	1.20	1.15
33-33.9	1.27	1.22	1.17
34 & above	1.29	1.24	1.19

Iowa schedule includes Black Bayou & White Castle La. fields.

Roanoke schedule includes Chalkley, La. field.

Gibson schedule includes S. Houma, Hester & W. Lake Verret, La. fields.

Happytown field, St. Martin Par., La. $1.15

Posted by Arkansas Fuel Oil Corp.

Urania, La. (May 22, '41) $1.15

Posted by Continental Oil Co. (May 21, '41)

Tepetate, La. $1.18
Ville Platte, La. 1.20
Lake Arthur, La. 1.18
Ritchie, La. (Sept. 1, '41) 1.08

Abbeville, La.

Below 36 $1.07	37-37.9 $1.11	39-39.9 $1.15
36-36.9 1.09	38-38.9 1.13	40 & above 1.17

CANADIAN FIELDS

Posted by Imperial Oil Limited

Western Ontario (Nov. 6, 1939)

Petrolia ..... $2.10 Oil Springs $2.17

Turner Valley Crude Oil (July 16, '41)

(Prices FOB producer's tankage)

33-33.9 $1.35	44-44.9 $1.57	55-55.9 $1.79
34-34.9 1.37	45-45.9 1.59	56-56.9 1.81
35-35.9 1.39	46-46.9 1.61	57-57.9 1.83
36-36.9 1.41	47-47.9 1.63	58-58.9 1.85
37-37.9 1.43	48-48.9 1.65	59-59.9 1.87
38-38.9 1.45	49-49.9 1.67	60-60.9 1.89
39-39.9 1.47	50-50.9 1.69	61-61.9 1.91
40-40.9 1.49	51-51.9 1.71	62-62.9 1.93
41-41.9 1.51	52-52.9 1.73	63-63.9 1.95
42-42.9 1.53	53-53.9 1.75	64 & over 1.97
43-43.9 1.55	54-54.9 1.77	

Absorption Gasoline (July 16, '41)

90% Rec., 20 lb. Reid v.p. $2.28
90% Rec., 17 lb. Reid v.p. 2.44

ROCKY MOUNTAIN FIELDS

Posted by Stanolind Oil & Gas Co. (May 20, '41)

Salt Creek (except Tensleep crude), Midway & Dutton Creek, Wyo.

Below 29 $0.96	32-32.9 $1.04	36-36.9 $1.12	
29-29.9 .98	33-33.9 1.06	37-37.9 1.14	
30-30.9 1.00	34-34.9 1.08	38-38.9 1.16	
31-31.9 1.02	35-35.9 1.10	39-39.9 1.18	
		40 & above 1.20	

Wyoming:

Tensleep Crude $0.6785	
Frannie Light .70	
Frannie Heavy .47	
Hamilton Dome .45	

Wyoming:

Grass Creek Light	$1.00
Grass Creek Heavy	.50
Elk Basin	1.00
Iles, Colo.	1.07

Posted by Ohio Oil Co. (May 20, '41)

Elk Basin, Wyo. $1.00
Grass Creek Wyo., Light 1.00
Rock Creek, Wyo. 1.15
Lance Creek, Wyo., (July 1, '41) 1.12

Posted by Continental Oil Co. (May 21, '41)

Ft. Collins & Wellington, Col.

Below 29 $0.96	32-32.9 $1.04	36-36.9 $1.12	
29-29.9 .98	33-33.9 1.06	37-37.9 1.14	
30-30.9 1.00	34-34.9 1.08	38-38.9 1.16	
31-31.9 1.02	35-35.9 1.10	39-39.9 1.18	
		40 & above 1.20	

Canon City & Florence, Col. $1.05	Big Muddy, Wyo., (May 30, '41) $1.08
Cat Creek, Mont. 1.15	Lance Creek, Wyo., (July 1, '41) 1.12

Posted by Independent Pipe Line Co. (Aug. 1, '41)

Falls City, Neb., field price $0.90
Falls City, Neb., loaded in tank cars 0.95
Shubert, Neb., loaded in tank cars 0.97

SOUTHEASTERN FIELDS

Posted by Allied Pipe Line Corp.

Tinsley (Miss.) Crude (Oct. 16, '41)

24-24.9	$0.745	32-32.9	$0.905
25-25.9	.765	33-33.9	.925
26-26.9	.785	34-34.9	.945
27-27.9	.805	35-35.9	.965
28-28.9	.825	36-36.9	.985
29-29.9	.845	37-37.9	1.005
30-30.9	.865	38-38.9	1.025
31-31.9	.885	39-39.9	1.045
		40 & above	1.065

Pickens (Miss.) Crude (Dec. 16, '41)

24-24.9	$0.685	32-32.9	$0.845
25-25.9	.705	33-33.9	.865
26-26.9	.725	34-34.9	.885
27-27.9	.745	35-35.9	.905
28-28.9	.765	36-36.9	.925
29-29.9	.785	37-37.9	.945
30-30.9	.805	38-38.9	.965
31-31.9	.825	39-39.9	.985
		40 & above	1.005

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Published every Wednesday by The National Petroleum Publishing Co.

WARREN C. PLATT, *Editor and Publisher*
V. B. GUTHRIE, *Managing Editor*

Member of Audit Bureau of Circulation and Associated Business Papers Inc.

Publication office: 1213 W. Third St., Cleveland, Ohio, U. S. A. Telephone, CHerry 7672. Cable Address PLATTOIL, Cleveland. Cable inquiries are answered by mail unless subscriber advances sufficient funds in American money to cover our cable costs.

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Seiberling Rubber Co. 22, 23
Shell Oil Co., Inc. 19
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PERSONALS

J. Howard Myers, safety engineer for Atlantic Refining Co. and vice-chairman for manufacturing of the Petroleum Section of the National Safety Council, has been commissioned a Lieutenant Commander in the Navy and is assigned to the Philadelphia Navy Yard.

° ° °

Tim Maffitt, Houston, Tex., safety director of the Houston Oil Co., has joined the Ferrying Command as a first lieutenant.

° ° °

Mary Creech Parker, Raleigh, N. C., daughter of Mr. and Mrs. **William A. Parker,** was married on Aug. 8. to **Sgt. Truman P. Woodward.** The bride was attended by her sister **Katherine.** Mr. Parker is secretary of the North Carolina Oil Jobbers Assn.

Sgt. Woodward was an oil man prior to his entry into active duty. He had worked for Carter Oil Co. and was preparing to leave for Venezuela where he was to work for the Standard Oil Co. He received a master's degree in geology from Louisiana State University in 1940 and is a member of the Geology and Mining Society. He is now stationed at Fort Bragg, N. C., as an instructor in radio communications.

Mrs. Woodward has been connected with the Wachovia Bank and Trust Co. for the past 4 years and is now a teller. For the duration, the couple will make their home in Raleigh.

Mrs. Woodward Sgt. Woodward

Joseph L. McHugh, Louisiana's Commissioner of Conservation, has tendered his resignation to **Gov. Sam Houston Jones** and is making a strong race for Congress in Louisiana's 7th Congressional District. This district produces about one-third of all the oil in the state. Gov. Jones has not acted as yet on Mr. McHugh's resignation. Primary election is to be held Sept. 8.

J. L. McHugh

° ° °

C. W. Healy, Gulf Refining Co., is chairman of the Kentucky Inter-Industry Salvage Committee. His goal is to have every Kentucky service station cooperate in helping the government get in the scrap.

° ° °

Ohio Petroleum Marketers Assn.'s board of directors announces election of **Charles H. Miller,** Zanesville, Miller Oil Co., as member of the board to fill the unexpired term of **John Stevens** of Genoa, who resigned. Mr. Miller was Muskingum County chairman in the scrap rubber campaign and is now acting in similar capacity in the Salvage for Victory drive.

° ° °

Sam Bohlen, manager of the Snyder Oil Co., Orrville, Ohio, and Ohio Petroleum Marketers Assn., has received notice that he has passed the tests for enlistment in the officer's training school of the U. S. Army, the O.P.M.A. reports. His induction date is set for Aug. 29.

Sam Bohlen

Mrs. Bohlen and **Mrs. Gladys Tschantz** will manage the office affairs of Snyder Oil Co. while he is in the Army. Mr. Bohlen has resigned from his position as vice-chairman of the Petroleum Section of the All-Ohio Safety Congress.

° ° °

Edward G. Seubert, president of Indiana Standard, has entered his 51st year of service with the company.

J. F. McManmon, Tulsa, executive staff member of Hanlon-Buchanan, Inc., has been ordered to report for duty as a technical executive engineering officer at Wright Field, Dayton, Ohio. Before joining Hanlon-Buchanan, Mr. McManmon was vice-president of National Bank of Tulsa, and for many years has been active in production of crude oil and construction and operation of pipelines.

° ° °

Fred C. Davern was appointed assistant manager of the railroad sales department of New Jersey Standard on Aug. 1, **A. Clarke Bedford,** assistant general manager announces. Mr. Davern has been railroad sales engineer with the company since 1883.

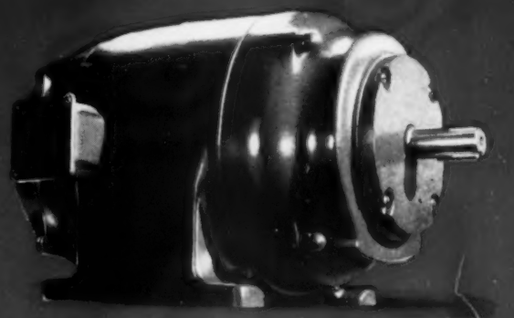
F. C. Davern

° ° °

R. S. Orr, manager of the LaCrosse, Wis., sales division of Indiana Standard since 1940, will retire on company annuity Oct. 1 due to disability, company reports. He has 35 years service during which he served as assistant manager in the St. Joseph, Mo., division; manager at Wichita, Kans.; and manager at Indianapolis, Ind. **R. T. Kinneman,** manager at Quincy, Ill., will succeed Mr. Orr and **H. M. Dawson,** assistant manager at Quincy, will succeed **H. E. Purdy** as assistant manager (reseller) at Kansas City, Mo. Mr. Purdy has been granted leave of absence to join the armed forces. The Quincy sales administration and accounting office will be discontinued although storage and shipping facilities will be continued. Employes affected by the change have been offered positions elsewhere in the organization.

° ° °

Graham Spry, who has been associated with Standard Oil Co. of Calif. interests in London during the last five years, has returned to London after an absence of four months. During his absence, Mr. Spry acted as one of the two personal assistants Sir Stafford Cripps took with him on his mission to secure a solution of the Indian problem.



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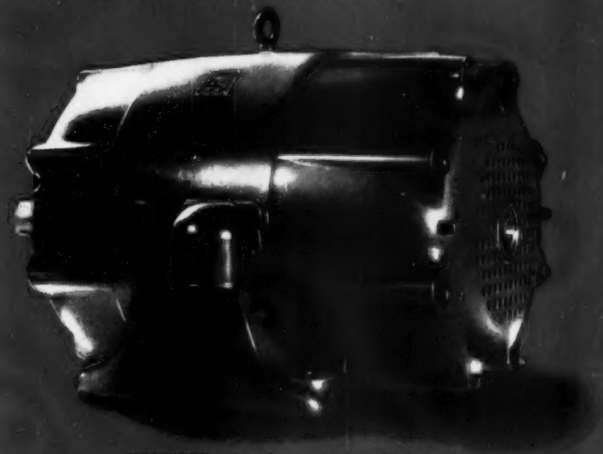

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Monthly Technical Section Devoted to
REFINERY MANAGEMENT and PETROLEUM CHEMICAL TECHNOLOGY

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Volume 34 | August 26, 1942 | Number 34

New Refinery Units Swell the Flow Of Fuel for Fighting Flyers

Catalyst cases of new Socony-Vacuum Houdry unit

War's Challenge Draws Ingenious Response Of Nation's Refiners

Refinery Conversion to Supply Many Products for War

New methods applied in existing plants turn out materials not only for synthetic rubber and aviation gasoline, but also for explosives, chemicals and industrial products R-247

How Refiners Meet Shortages With New Plant Designs

Substitution of concrete, brick and wood for structural steel and the use of less steel for equipment supports in wartime refinery design are emergency practices being adopted by oil companies to overcome war's shortages R-251

Conserving Gas Compressors In War Refining Plants

1—Practical suggestions by an authority for converting standard air and gas compressers to service in butadiene units R-254

2—Shell Oil Co., Inc., tells methods it used to save buying 6000 h.p. of new compressers for wartime refineries R-256

New Refinery Bolting Steels Conserve Critical Alloys

Wartime standards also call for specifying actual metal temperatures, in place of flow temperatures, in refinery bolting and studs R-257

Pumping Requirements Severe In Wartime Refining Plants

New problems include the transfer of light liquid hydrocarbons in large volume and the selection of corrosion-resistant materials for pump parts where acids are handled R-263

Replacing High-Alloy Steels In War Refinery Service

Available substitutes to replace high chromium and nickel alloy steels for corrosion resistance and extreme temperatures in today's war refineries are discussed R-265

Acetylene, Other War Chemicals Produced by New Process

Thermal cracking in regenerative furnace produces acetylene and ethylene and has possibilities for making butadiene direct, benzene and other hydrocarbons essential to the war effort R-270

Dr. E. R. Weidlein

Technical Consultant to the U. S. On Synthetic Rubber

● When officials of the War Production Board and the Reconstruction Finance Corp. in Washington want information on the basic technology of synthetic rubber, they turn to Dr. Edward Ray Weidlein, director of the Mellon Institute at Pittsburgh. He is serving as Senior Consultant to the Chemicals Branch of the War Production Board and as chairman of the Synthetic Rubber Committee set up jointly by the two government agencies. In addition, he is continuing as director of Mellon Institute, which has under way about 100 investigational projects concerned with war problems and public welfare.

Dr. Weidlein has a petroleum background: his father was an oil producer in Augusta, Kans. He attended the University of Kansas and did his first research work there. He became director of Mellon Institute in 1921. His own research activities have been in other fields than petroleum. He is a well known author on industrial research achievements.

REFINERY MANAGEMENT *and*
PETROLEUM CHEMICAL TECHNOLOGY

August 26, 1942
Volume 34
Number 34

A MONTHLY TECHNICAL SECTION OF NATIONAL PETROLEUM NEWS *incorporating International Petroleum Technology*

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Refinery Conversion Program Will Provide Oil Products To Meet Many War Demands

EXISTING refining facilities in this country will be more extensively converted from making peacetime products to war production than was thought possible a few months ago.

New operating methods for making and purifying the hydrocarbon compounds, which are materials for aviation gasoline, synthetic rubber, explosives and industrial products, from present and improvised equipment, have been worked out by the refining technologists and the Office of Petroleum Coordinator at Washington.

Groups of refineries and natural gasoline plants, including thermal cracking, polymerization, dehydrogenation and alkylation plants, have been hooked up as complete operating units in various refining territories. The technique of operating these groups as a unit, has been developed and smoothed out.

The recent announcement from OPC's refining division of the correlation of the refiners' cooperative program for the "quick" production of butadiene with that for making aviation gasoline from existing equipment insures greater flexibility. By minor operational changes within the operating groups, the relative volumes of various products can be altered as necessary, technologists say, so that materials not needed in one program at any time can be diverted to another purpose.

Safeguard Against Slowdown

Another advantage of the correlation of the conversion programs is that, if any plant in an integrated unit is put out of operation temporarily, as by bombing, its raw materials can be diverted to other plants without serious interruption. Also it will provide for bringing the largest possible number of refineries and gasoline plants into the program and make fullest use of facilities and equipment of present plants, large and small.

As a result of progress to date, it is expected the program to produce "quick" butadiene from converted plants will be in operation by

Jan. 1, 1943, at a rate of 200,000 tons a year, to fill the gap in the supply of rubber at least for military needs until permanent butadiene plants are constructed. Also by the coordination of this program with that for the manufacture of aviation gasoline from present refinery facilities, the output of 100-octane gasoline will be increased above earlier estimates. About 25 groups of integrated plants will be required for the "quick" butadiene program, it is said.

In this operation, thermal plants crack naphtha from "distress" motor gasoline at 1400 to 1450°F. and at low pressure and make butadiene, benzene, toluene, xylene, normal butylenes and isobutylene. These are processed further, or purified, in the polymerization and other facilities. The amount of butadiene produced in the conversion is only a small portion of the volume of all products needed for war purposes that is obtainable, it is said.

"Quick" Products Listed

The various uses of these hydrocarbon compounds for the manufacture of butadiene and of materials for styrene, Butyl rubber, aviation gasoline, explosives and industrial products are as follows:

Benzene: For raw material for cumene (isopropylbenzene) for aviation gasoline; for ethyl benzene, an intermediate product in the manufacture of styrene, one of the components of Buna type rubber; for raw material for explosives; and industrial uses.

Toluene: For raw material for TNT, for industrial uses; or to be used in 100-octane aviation gasoline.

Xylene: For industrial solvents; for use in the same form in aviation gasoline; or for conversion to toluene by reaction with benzene.

Normal butylene: For alkylate for 100-octane gasoline; for combination with isobutylene to produce codimer to be hydrogenated to produce commercial isooctane for 100-octane gasoline; or for charging stock in making butadiene.

Isobutylene: For material for alkylate for 100-octane gasoline; or for polymerization with a diolefin into the Butyl-type rubber, Flexon.

Butadiene: For Buna type synthetic rubber.

Product Demands Shift

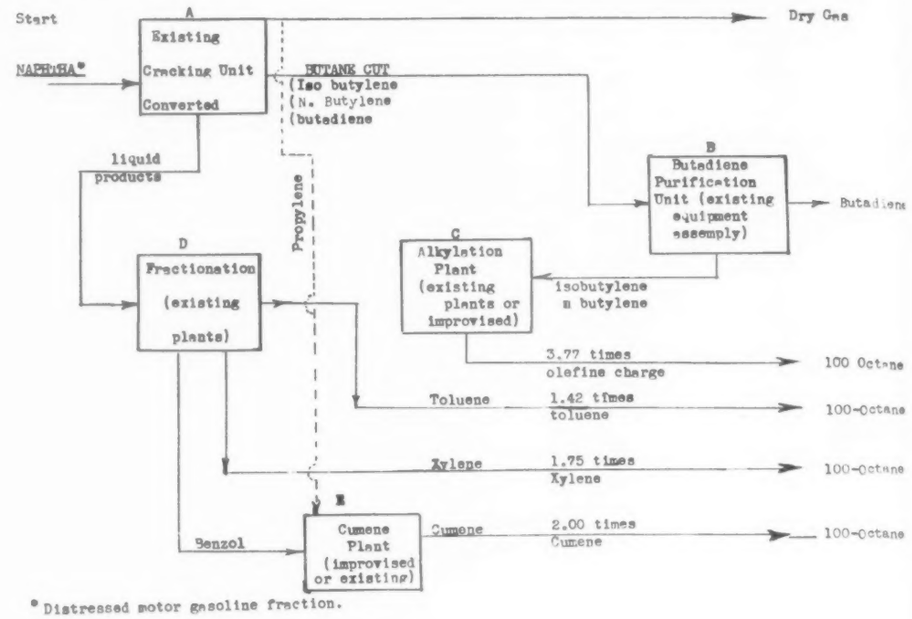
A few examples are cited by authorities of the variation in war demand for these products. Toluene, it is said, will be needed for the next several months until the permanent toluene plants now under construction are completed. Benzol can now be made as material for aviation gasoline, but later it will be needed for ethyl benzene to make styrene. Isobutylene can now go into 100-octane aviation gasoline, but, as Butyl rubber plants are completed, it will be needed as raw material for these plants.

Normal butylene can now go into 100-octane gasoline, but later it may be needed for charging stock for butadiene catalytic plants; or it may substitute for isobutylene now going to a hydrogenation or alkylation unit, so that the isobutylene thus freed can go to a Butyl rubber plant or Flexon unit.

At the refining plants included in the conversion program only a relatively small quantity of non-war products will be produced and these will be mainly direct by-products of the conversion program. However, it is pointed out that, in some instances, the continued operation of other departments of the refinery in which converted equipment is used may be necessary to satisfy civilian demand, or to produce the power, steam and fuel supplies and to consume gas generated in the processing of war products.

100-Octane 'Gas' Supply Boosted With Butadiene By-Products

Fig. 1—Diagram of technique of producing butadiene from existing refining plants. In this illustration other products are all converted into materials for 100-octane gasoline.



* Distressed motor gasoline fraction.

A chart issued by the Office of Petroleum Coordinator (See Fig. 1) shows graphically the program for producing butadiene in existing refinery equipment, using exclusively as charging stock naphtha from "distress gasoline". In the illustration, primary products are converted to the end products only, butadiene and 100-octane gasoline, with dry gas as fuel.

The plants doing operation "A" in the chart include only the cracking unit. Actually, other operations may be done in the same or other plants. The total number of plants required will depend upon the sizes of furnaces available, tower equipment sizes and the location of cracking plants in relation to units processing primary products made in the cracking plant.

Referring to the chart, Plant A separates 3 main product streams; dry gas, a butane-butylene cut, and a liquid product. In actual operations the concentration of butadiene in the C_4 cut would depend on the nature of the naphtha charging stock and the temperature-time relationship in the cracking operation. Also, the concentration of butadiene would have an important bearing on the size and capacity of the purifying unit B.

Plant B charges the butane-butylene cut and extracts the butadiene by solvent extraction from the butylene and isobutylene. Such units are preferably in the immediate vicinity of Plant A and are improvised from normal equipment, usually working around a nucleus of equipment in place.

Alkylate Hikes Volume

The normal butylene and isobutylene from Plant B, in the example cited for maximum 100-octane aviation gasoline production, goes to alkylation unit C, where it is alkylated with isobutane. When this alkylate is blended with the average aviation gasoline base stock, it will increase to 3.77 times the volume of aviation gasoline represented by the isobutylene-normal butylene (olefine) charge. Some spare alkylation plant capacity is said to exist, in which this raw material would be used. If no alkylation plant existed in the territory, an improvised alkylation plant could be assembled if 100-octane gasoline were the more needed product.

The liquid aromatic hydrocarbons produced in the butadiene program in any single actual operating unit would represent too small a volume to be handled economically or efficiently in any one plant. Being a liquid, this material can be shipped in conventional tank cars to Plant D best fitted for the job. Only three such plants might be necessary, it is stated; one each for the Pacific Coast, Gulf Coast, and Mid-Continent.

In these plants the individual aromatic products, benzene, toluene and xylene, would be separated, fractionated and purified. The toluene and xylene, when blended with base stock, would represent increased quantities of 100-octane gasoline. These materials, when mixed with other average 100-octane gasoline, increase the rich mixture performance of the overall 100-octane fuel.

Plant D also separates the benzene as such. While this can be used in 100-octane gasoline, in actual operations it might be converted in another improvised plant (Plant E on the chart) into cumene (isopropylbenzene). In this form, a larger volume of aviation gasoline could be secured of increased "rich mixture performance". Cumene is made from benzene and propylene, the dry gas produced in the primary cracking operation being a source of large volumes of propylene.

Other typical instances of the conversion of existing refineries to make wartime products are cited by the OPC's refining division as follows:

A refinery with an alkylation plant producing alkylate for 100-octane gasoline, by varying operating conditions, may be able to produce more alkylate if additional raw materials are available. Other refineries may supply butylenes to the first plant to enhance its alkylate output. Or if this first plant has isobutylenes available and such materials are needed for Butyl rubber, this plant may release its isobutylene for this purpose and accept for material for its alkylation unit the butylenes from other plants.

A polymerization plant originally built to produce high-octane motor gasoline by polymerizing butylenes and other olefines may convert butylenes and isobutylenes into a "selective polymer" (codimer). This codimer can be shipped to another plant, where it can be hydrogenated in existing equipment to produce commercial isooctane, which is equivalent to alkylate for 100-octane gasoline. In some instances, hydrogenation units may be able to release isobutylene formerly produced, which was required for 100-octane gasoline, and the isobutylene may be used for Butyl rubber material.

In other plants polymerization units originally built to produce motor gasoline may be converted to the manufacture of cumene for 100-octane gasoline, using as stock benzene obtained from some other plant.

Isobutylene Produced

Another illustration is of a refinery conducting cracking operations as a part of normal operations having available in the refinery gases isobutylene which is not finding its way into war products. By the installation of special equipment, largely obtainable second-hand or from its own spare equipment, this refinery may produce diisobutylene. This material can be shipped in ordinary tank cars to another plant, where it can be recracked to produce isobutylene for Butyl rubber or alkylate.

Another plant may recrack codimer if it is not required for 100-octane gasoline manufacture, and obtain isobutylene and butylenes. The latter can be used for alkylate for 100-octane gasoline or for charge material for butylene-to-butadiene plants. Any butylenes produced in any of the conversion operations and not otherwise in demand, can be used as charge materials for butylene-to-butadiene plants.

Houdry 'Quick' Butadiene Process Runs on Assembled Equipment

An additional important part of the proposed refinery conversion program involves using existing equipment to assemble catalytic dehydrogenation units for the production and purification of butadiene from butane. This is typified by the Houdry butadiene process shown in Fig. 2.

The raw material charged to these catalytic dehydrogenating units is normal butane (substantially pure). This process can be applied either to natural gasoline plants (A) or to refineries having alkylation unit (C) or to plants having efficient gas recovery units (H). In the case of the gasoline plants, they must either be equipped with a butane fractionating unit (F) or new or improvised fractionation units could be built from existing equipment.

Relatively pure normal butane is charged to the Houdry unit, which is assembled out of existing equipment (catalyst cases made out of old shell stills, brick-lined) with the exception that new automatic valves and controls must be fabricated in most cases.

In the operation, the butane is first converted into butylene and then the butylene (including recycled butylene) into butadiene. The converted mixture of butanes leaving the Houdry unit (G) contains butadiene and normal butane-normal butylene blend. The mixture of this material goes to the butadiene purification unit (B) which is identical in design with Plant B in Fig. 1, naphtha conversion. This unit also would be assembled out of existing equipment.

With a catalytic dehydrogenation unit of this type it would be important to have the butadiene purification unit immediately adjacent, for in this operation the purification plant returns the recycle directly back to the catalytic unit.

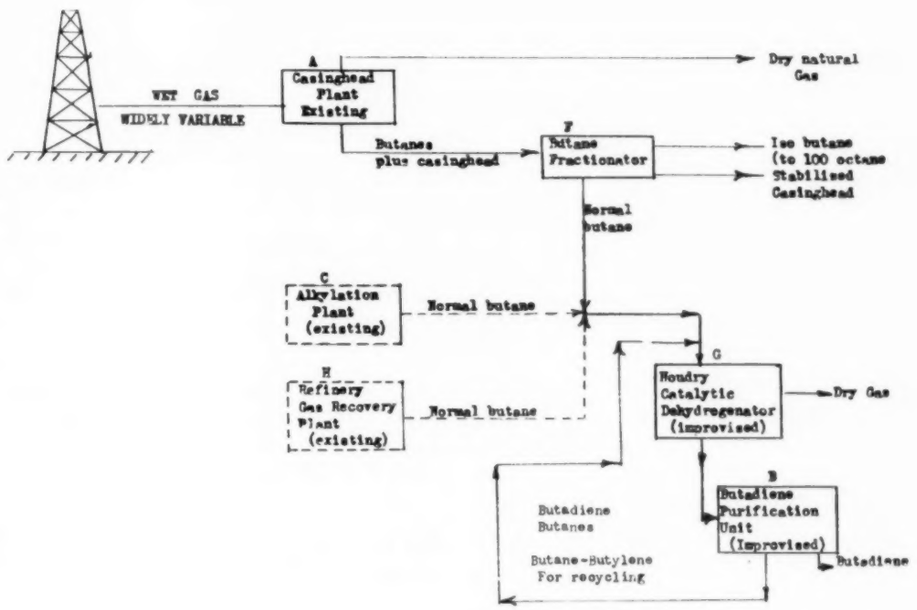


Fig. 2—Diagram for conversion of butadiene from normal butane in Houdry catalytic dehydrogenation unit, which can be assembled from existing materials

Aviation 'Gas' Production Continues During Conversion of Refineries

In view of the variation in war demand for various petroleum products from time to time, it is recognized by the Office of Petroleum Coordinator that it is not possible to establish a rigid order of preference for butadiene and accompanying products. However, it is felt there will not be conflicts in many cases and that the correlation of the "quick" butadiene program with that for aviation gasoline will enable all requirements on existing plants to be met to best advantage.

Deputy Petroleum Coordinator Davies suggests that refiners and natural gasoline plant operators apply the following generalizations in considering the application of the various conversion processes to their situations:

"1—Present production and presently planned increases in production of 100-octane aviation gasoline components should be maintained.

"2—Construction of facilities to produce 100-octane aviation gasoline should not be interfered with; but it is permissible and desirable to convert existing equipment to produce codimer, diisobutylene or ethyl benzene until the new aviation gasoline equipment is started.

"3—Temporary operations for periods of as little as 6 months are desirable.

"4—Existing catalytic polymerization plants now in operation and not at present allocated to cumene production should be converted to codimer operation.

"5—Refiners not utilizing their present production of isobutylene to make 100-octane gasoline components should consider the installation of an improvised cold acid extraction plant, provided their production of 100-octane gasoline can be maintained. Consideration should also be given in such cases to delivering the C_4 fraction or mixed C_3 and C_4 fraction to a nearby refinery already operating a catalytic polymerization, cold acid or alkylation plant.

"6—Existing shut-down thermal cracking units not as yet planned to include in the butadiene program should be considered for conversion to the production of ethyl benzene."

Details of the approved conversion methods and technique are available to all interested refiners through the Director of Refining, Office of Petroleum Coordinator, Washington.

Aviation Engineer Paints Vista of Large New Oil Refineries

Flyer Puts Navy and Cargo Ships in the Air

Following are quotations that picture the future demands on oil refineries, as well as possible type of new aviation fuel, from the new book of Major Alexander P. de Seversky, entitled "Victory Through Air Power". This is a Book-of-The-Month-Club book and much of its contents is being published in leading daily papers over the country to arouse the public's active support for larger and better air fleets.

By Warren C. Platt, Editor

The specifications for tomorrow's refineries, their size and number and their products, are contained in prophetic vision in the pages of the recent book—"Victory Through Air Power", by Major Alexander P. de Seversky.

A brief sketch of those specifications, particularly as to the products, is given on this page. But while those specifications call for new fuel, a much lighter fuel, maybe even a tablet or a vitamin, an elixir-like fuel and a non-inflammable fuel, that is but a small part of the picture of oil refineries for tomorrow.

The rest of the picture is of the vast size and tremendous quantity of output for oil refineries, for Major de Seversky puts the Navy of all America and the merchant fleet as well, into the air in planes of such size as to feed England every day; feed England hot foods cooked that morning in American ovens—in planes of such size and number as to win the war and end the war—and in planes of such flying range as to encircle the globe without once alighting. This last he predicts for within the next five years.

If the engineers and chemists of the technical world of oil will read this new book of Major de Seversky's, they will get a vision of flying of tomorrow that, when one stops to think of it, is but the natural growth of the great development from the last war's "crates" to this war's better than 400 miles-an-hour ships.

Just take the sweep of his vision and translate it into refineries—into refinery research for the non-inflammable fuel and for the fuel that will weigh only half as much as that of today, or less.

Take all this and you will see in the next year, to 2 years to 4 years to 5 years, more refineries and refining capacity than we ever dreamed of. They will be not only refineries that will make synthetic rubber for the bulging mastodonic tires of all these air ships, and that will make the toluol for the bombs and shells they carry; but they will be the refineries that will help make this dream of the major's come true through providing the floods of high octane gasoline and still better fuel.

One wonders if this administration at Wash-

(*Continued on page R-255*)

Hot Foods Daily to England

"An ever-larger portion of sea commerce is likely in the near future to be carried by airplanes, not by vessels. In intrinsic value, if not in weight, transoceanic air commerce is destined in the future to surpass surface commerce. Even now most American bombers are delivered across the ocean on their own power, and pursuits could easily have been built to do likewise, if those in charge of national-defense had not let their prejudices blind them to the opportunity. Such equipment had been proposed to them, but was rejected and ridiculed. . . .

"It has been estimated that the British Isles need some 25,000 tons of imported foodstuffs daily. Five hundred planes of the Douglas B-19 size, carrying 50 tons each, could keep the islands supplied more expeditiously than any ships; food could if necessary be cooked in America in the morning and delivered steaming hot in Europe in the evening. If transported in dehydrated form (especially such items as vegetables, fruits, milk, eggs, dried meats), the foodstuffs would have only one-fifth to one-seventh of their original weight. Through dehydration processes, only 5000 tons daily might keep England nourished, and only 100 planes a day could accomplished this miracle."

Aggressive Research Promises Another Revolution In Air Engineering

"No modern air-power organization is worth its keep unless it provides the widest scope for research and experimentation, to the point of actual development and construction of experimental equipment, instruments, fuels, engines, airdromes, armament, building materials. The problem here is to organize the broadest facilities for governmental enterprise while encouraging private enterprise to the utmost. Neither political nor 'ideological' barriers must be tolerated on the path to American aviation leadership. Not for a moment must we forget that a great advance in the quality of equipment by any nation may alter the balance of forces in the air at a single blow, regardless of the numerical ratio.

"What if a new fuel, so light and compact that it solves the problem of range, were suddenly developed?

"What if stratosphere flying on the reactive-propulsion principle became a reality overnight?

"What if some new alloy, like beryllium or even lighter, were adapted for aviation use?

"What if the efficiency of engines were raised to cut down gas consumption to a fraction of the present consumption?

"It was not so long ago that I flew with engines consuming 0.7 lbs. of gasoline per hour per h.p. at cruising speeds. Recently, in long-range pursuit flights, my engine consumed only 0.35 lbs.—a decrease of 100%—which means double the range, double the striking power, or a combination of both. Another such doubling of engine efficiency would, at one sweep, give the present Condor type Nazi bomber, with a range of 5 to 7 thousand miles, a range of 10 to 14 thousand miles—more than enough to lay the entire United States wide open to bombing, even with existing Axis aviation equipment. The same kind of transformation would be achieved if the specific weight of fuels were cut in half. . . ."

Pipelines to be Necessary to Bring Big Volume of Fuel to Air Fields

"Safety fuels will be developed to resist incendiary shells. Quite possibly engines of the fuel-injection type will be evolved, to operate both on high-octane fuels and crude oil (low flash point fuel oil—Ed). This will enable us to store high-octane in armored parts of the plane for the take-off and combat purposes while non-inflammable heavy oils are used for approach and return. . . .

"The battleplane, requiring no space for bombs, may ultimately carry all its engines, as well as the crew, explosives and high-octane fuels, in the fuselage—all enclosed in an armored nacelle. . . .

"Operational airdromes for the striking force will need no facilities except runways and fuel pipelines running to remote reservoirs. For all types of aviation, indeed, pipelines must be developed in order to minimize hazards of overhead attack. The attack forces, in particular, will require this sort of servicing because of the tremendous gasoline loads they must take on board for transoceanic assignments. When we visualize continuous long-range aerial operations involving the use of millions of gallons a day, it becomes obvious that direct and continuous flow of gasoline to airfields is necessary. Overland transportation and service would be utterly inadequate for the magnitude of the needs. . . .

"Air power is the American weapon. It will not fail us, if only we unchain it and provide immediately the minimal conditions for its unhindered development."

How Refiners Meet War Shortages With Special New Plant Designs

731
732
733

WAR REFINING ARTICLE

CONSERVATION of steel and other materials in new refinery construction is already being effectively accomplished by many wartime modifications. These include designing plants to fit only the actual specified operating requirements, more careful use of all materials, and ingenious substitutions for the "scarce" materials which are being restricted to military needs.

The adoption of these new conservation ideas in the building of the new refining units needed to make ample supplies of essential wartime petroleum products is being expedited by the clearance of sound new construction practices through the Procurement Section of the Refining Division of the Office of Petroleum Coordinator. Oil company engineering departments and refinery construction firms contribute their experience and this is passed on to refinery owners and operators in bulletins from Max B. Miller, procurement section chief.

Many of these conservation practices are emergency provisions, adopted for the duration of the war only. However, a large number will continue in effect after the war, for they are bringing about savings in costs and construction time for refiners. Also, in the operation of the plants, they will be found in many instances to maintain the standards for safety to which refiners have been accustomed and to allow for normal life of the plants. The outcome of the present pooling by the oil industry of information on technical processes and on plant construction to aid the war effort will be the adoption of a new technique in planning and building refinery units that would have taken many years to bring about in peacetime.

Among the modifications in refinery design which are now being studied by engineering departments for their possible permanent adoption are included:

1—Erecting steel structures only where necessary for the support of equipment. Reinforced concrete is being used for buildings, stacks, foundations and skirting for vessels; for condenser and cooler boxes; and is substituted for support of piping and other equipment where operating conditions will permit. Brick is used in some instances.

2—Reducing the amount of steel used in platforms, stairways, means for access to towers and drums and all framework and supports where practicable. Wood, treated for resistance to fire and rotting, is being used for flooring, stair treads, handrails, etc.

3—Elimination of steel sheets used as casings for boilers, heaters and exchangers. For outside installations, waterproofed insulation is being used in place of steel casings.

4—Pumps are being designed for outside installation to save pump buildings. Where standard motors are used, when explosion proof motors cannot be secured, special types of hoods are built.

5—Piping and manifold systems are being designed in as compact units as possible, so piping and interconnecting lines can be reduced. Lines ordinarily installed to carry future products are eliminated. Number of valves is being reduced and plug cocks substituted for steel valves where possible.

6—Control equipment is being limited to that necessary to provide satisfactory operation of the unit. Synthetic stone material can be substituted for steel plate on instrument boards; and plastic tubing, or steel, used in place of copper.

7—Spare and standby equipment is reduced to the minimum necessary for continuous operations. In some instances, small refineries, where advantageously located, are pooling their standby compressors and other equipment to reduce the number necessary for any individual plant.

These suggestions for conservation of materials are given in the latest bulletin, Wartime Plant Design, from the Procurement Section of OPC. The bulletin includes contributions from the following oil companies and refinery engineering firms: Atlantic Refining Co., Babcock & Wilcox Co., Continental Oil Co., Foster Wheeler Corp., M. W. Kellogg Co., Lummus Co., Standard Oil Co. of California, Standard Oil Development Co., Universal Oil Products Co.

The official war emergency modifications of the general engineering department of Standard Oil Development Co. are also published in full in this bulletin. They cover simplification of construction; substitution of cast iron valves, fittings and other equipment for steel; and reduction in the use of structural steel, among other practices. The portion of the modification of standard specifications affecting plant design and construction is as follows:

Modifications in Basis of Plant Design For Duration of Wartime Emergency

The recommendations of a conference called by the War Production Board on March 31, 1942 at Cleveland, concerning the scarcity of nickel and chromium are adopted. These are:

1—Where nickel and chromium are used to extend the life of the plant, the basis of design of new plants should be an estimated 3-year life without the necessity for major repairs that might reduce the normal service factor more than 2%.

2—The principle of the previous recommendation should apply to all planned alterations and maintenance of existing plants wherever practicable.

3—Furnace castings for metal temperatures below 1400° F. shall not contain more than 1.5% nickel and 1.5% chromium.

Simplification of Construction

Structural Steel—Steel structures should be confined to those necessary for support of equipment. Platforms and stairways will be cut to a minimum. The use of reinforced concrete for support of equipment shall be given consideration to effect saving in steel.

Piping—Eliminate lines normally installed for operating flexibility or to permit future production of products not at present contemplated. Eliminate all cocks on the discharge side of safety valves. Block valves either side of control valves and orifice meters are to be eliminated, except in cases where trouble is definitely anticipated. Sufficient valves shall be included to permit hand control. Eliminate vents and valving around pressure gauge installations which are not absolutely essential for operation. Provide minimum pumpout facilities required for emptying main equipment and simplify system all possible. Eliminate check valves on pumps where damage is not likely to occur and where automatic spare service is not required. Reduce the use of double valving to a minimum.

Towers and Drums—The use of manholes and handholes is to be kept to a minimum. Only one manhead is to be provided on all drums without internal equipment. Permanent piping connections shall not be provided for auxiliary flushing and steaming of equipment when it can be accomplished by the use of a temporary hook-up.

Spare Equipment—The use of spare equipment, such as surge drums, extra exchanger tube bundles and similar equipment, is to be kept to a minimum, consistent with a reasonable service factor.

Instruments—Only sufficient control equipment shall be provided to insure satisfactory operation of the equipment. Additional instruments, usually provided for test and process control data purposes, shall be eliminated.

Control Houses—Control houses are to be simplified by the elimination of all unnecessary trim. The use of steel in their construction is to be kept to a minimum.

Lighting—Lighting, including flood lighting, shall be kept to a minimum. Provision should be made for "dim out" before blackout.

Power—Emergency stop push buttons for all pumps shall be eliminated. Separately mounted circuit breakers ahead of all 440-volt magnetic motor starters shall be eliminated by substituting the combination circuit breaker type starter.

Blowdown and Safety—The number of pull-down lines, seal drums, etc. shall be reduced to a minimum. Safety valves shall discharge to the air at a reasonable height above surrounding equipment, except in the cases where hot or condensable material may be released, or in other cases where a distinct hazard would

be introduced. All utility systems shall be made as simple as possible.

Substitution of Cast Iron

Cast iron valves and fittings should be used as outlined below:

Live Steam Valves & Fittings—Use cast iron, except for the following services where steel is required:

1—Steam mains 10 in. and larger where a failure would cause a shutdown of an important part of the plant.

2—Branch lines inside of battery limits where a failure would cause a serious shutdown of units producing products vital to the war effort.

3—Sizes 14 in. and larger.

4—Steam lines within the limits of boiler and powerhouses where the steam pressure is over 125 lbs.

Refinery Gas Line Valves & Fittings—Use cast iron with limitations given in the A.S.A. Standards and Piping Code for all lines outside of battery limits.

Refinery Oil Line Valves & Fittings (Outside of Battery Limits)—Use cast iron as limited by the A.S.A. Standards and Piping Code with the exception of lines carrying product lighter than motor gasoline.

Water Line Valves & Fittings—Use cast iron.

Valves & Fittings for Other Lines—Cast iron shall be used wherever it is considered reasonably safe including lines within battery limits and around operating equipment.

Reduction in Use of Steel In Structures, Buildings

In order to reduce the amount of steel used in structures and buildings, the types of construction outlined below shall be followed:

1—Reduce the amount of structures by the elimination of permanent construction for trolley systems for handling heavy equipment, space being provided for access for a crawler crane or temporary rigging and no provision being made for cleaning exchanger bundles in place. Eliminate some convenience platforms and reduce size of others. Operating platforms are to be confined to the lower levels of structures and maintenance platforms required above this level are to be bracketed from the equipment with access provided by ladders instead of stairways.

2—Reinforced concrete and wood are to be used wherever practicable in place of structural steel framing and checkered plate. Use reinforced concrete columns and beams on the lower operating levels and up to the supports of the principal pieces of equipment. Use wood as follows:

(a) All stringers and treads of stairways
(b) Ladders
(c) Railings
(d) Flooring of platforms
(e) Some framing where practicable.

All wood load-carrying members should be chemically treated for additional resistance to fire and rot. This should include stair stringers and treads, framing and flooring. Wood should not be used around hot equipment where a leak might result in a flash.

3—Foundations, concrete slabs on the ground and toe walls shall be designed to use mass concrete without reinforcement or with minimum reinforcement.

4—Control houses are to be constructed of brick walls with timber beams or timber trusses and timber plank roof covered with built-up roofing, wood doors, frames and sash.

5—Other buildings containing operating equipment, such as compressor houses, pump houses, etc. shall be constructed of brick walls with substantial buttresses, supporting and providing anchorage for wood roof trusses, wood purlins and wood plank roof with built-up roofing. Doors, frames, windows and louvres shall be wood. For this type of construction, it is necessary to keep all piping supports independent of the structure insofar as practical. Mufflers from gas engines should be supported outside of the side walls rather than on the roof structure. Provision shall be made for handling equipment during maintenance by portable A-frames rather than by overhead trolley beams. Special study shall be given to two-story structures utilizing reinforced concrete on the lower story and heavy timber mill construction on the upper story if feasible.

6—Drums shall be supported on reinforced concrete and, where the temperature permits, all access stairs, ladders and platforms shall be constructed of treated wood.

7—As far as possible, pipe lines are to be carried on concrete piers near the ground level, otherwise on reinforced concrete supports with steel cross-arms. Pipe bridges and anchor towers shall be constructed of structural steel.

8—Buildings for offices, laboratories and change houses shall be wood construction throughout for the superstructure of these buildings.

Reduction of Valve Requirements In Design of Plants

The recommendations contained in a memorandum from Max B. Miller of the Office of Petroleum Coordinator for War, file M-529, outlining suggestions to reduce valve requirements are to be followed. Many of the recommendations had been previously adopted and the balance are listed below.

1—Use plug cocks in place of steel valves where feasible.

2—Eliminate valves at towers which are installed solely for the testing of lines prior to starting up.

3—Use only one valve between towers and pumps on short suction lines.

4—Simplify manifold installations all possible.

5—Eliminate all but one valve in branch steam lines.

6—Simplify bypasses on exchangers all possible.

7—Use salvaged valves from other equipment.

Design of Low Pressure Towers

Low pressure towers shall be designed for the design pressure specified by the process designers or for static head when filled with water, whichever is greater. Provision shall not be made for hydrostatically testing towers after erection.

The following miscellaneous items are to be followed:

1—Use cement asbestos sheet in place of galvanized or asphalt coated iron.

2—Omit the use of galvanized nails.

3—Make sheet piling of wood where feasible and creosote it if for permanent installation.

4—Eliminate metal lath wherever possible.

5—Restrict the use of fence to built-up areas and construct fence with wood posts, ungalvanized mesh or wire and without metal top rail.

6—Flashing and downspouts shall be of ferrous material, nonmetallic coated or tight zinc coated.

7—Screening shall be of ferrous material painted for protection.

8—Sewer pipe shall be of terra cotta or concrete where practical and only light weight iron should be used when iron pipe is required.

9—Conduit shall be nonmetallic coated, except for extreme conditions and light weight conduit shall be used, except in hazardous locations. Nonmetallic sheathed cable shall be substituted for conduit where practicable.

10—Electric light fixtures shall be made with a minimum amount of metal permitted by the service conditions.

11—Heating coils and convectors for heating enclosed areas shall be made without the use of copper or copper bearing alloys and radiators shall be of cast iron.

12—Second-hand steel rails shall be used wherever possible.

13—Office furniture, lockers, shower stalls, etc. shall be of nonmetallic construction where possible.

14—Plumbing and heating fixtures and hardware shall be of unplated ferrous material.

15—Lavatory fixtures shall be of vitreous material.

16—Switch and receptacle plates shall be of nonmetallic material.

17—Use steel tubes in place of Admiralty where fresh water is used.

18—Use preload concrete tanks for oil and wood tanks for other services when the nature of the contents permits.

19—Use concrete, compressed asbestos or wood pipe for large water lines.

20—Use spring wound instead of motor driven instrument clocks.

21—Use Portland cement asbestos coverings in place of galvanized sheets for waterproofing insulation.

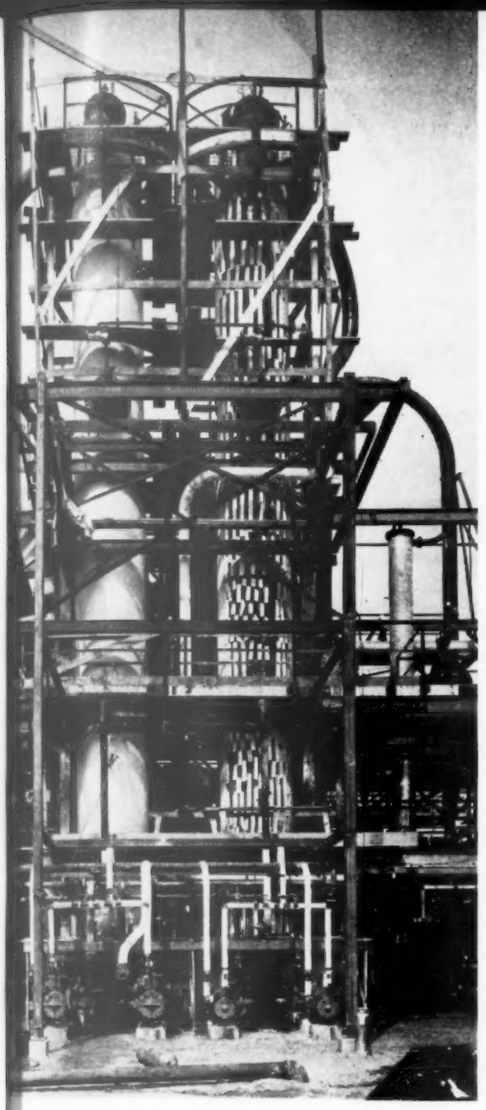
22—For internal parts of high temperature vessels, where failure of such parts would not increase the stress in the vessel nor otherwise endanger the vessel, use the value of stress for rupture in 100,000 hrs. as the design stress in place of stress for 1% creep in 100,000 hrs. or other approved Code stresses. This applies particularly to internal piping open to the vessel but subject to severe expansion strains, to load bearings grids for supporting catalyst or similar material, etc.

23—Use company-owned surplus and spare equipment wherever possible.

24—Idle equipment should be dismantled as a source of additional material.

25—Use steam power in place of electric or gas engine power where feasible.

Reclamation Projects Standardized To Save Working Time and Money



Two bubble towers equipped with internal reboilers made from old plate towers and containing 16 bubble trays made from reclaimed plate steel. Both were constructed by the reclamation department of Mid-Continent Petroleum Corp., Tulsa

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WAR REFINING ARTICLE

The refinery reclamation department of Mid-Continent Petroleum Corp., Tulsa, has been expanded for wartime emergency to include a fabrication department, where complete boiler and machine shop and fabricating equipment have been installed. Most of the fabrication is by conventional electric-arc welding. Riveted construction is used only when the reclaimed vessel originally was riveted—but even this is eliminated whenever practicable. Standardized plans are followed if possible to save working time and money.

Personnel of the reclamation and fabricating department numbers about 20. The boss is a boiler-maker and the men under him are expert welders, machinists and burners. The company's engineering department and the mechanical superintendent lay out the plans for revamping needed equipment from old materials.

In designing process equipment which is to be constructed from old materials, no departures from standard procedure for safety and proper life of the equipment are allowed. Metal thickness is computed with allowance for condition of the reclaimed material being used and, as a result, construction is generally heavier than normal throughout.

"This plant will last just as long, if not longer, than as if it were made from virgin material throughout," said E. M. Dons, chief engineer of the company, in describing a recently built unit.

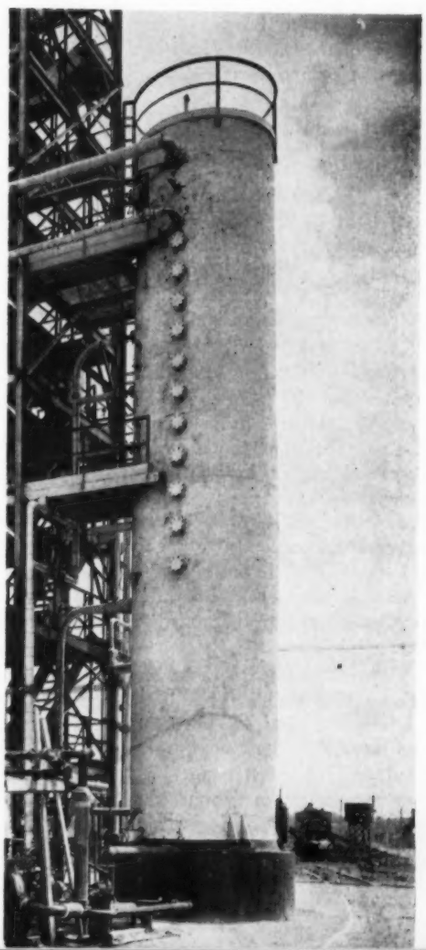
Costs Figured Individually

The costs which are allowed for reclamation projects are figured for the individual case and depend on the scarcity of new equipment. For example, it is very difficult to buy new heat exchangers, said Mr. Dons, and, since they are a vital item in the new processes and are important to savings in refinery operations, exchangers are rebuilt from what is available—almost regardless of cost.

Economy in operations in the reclamation department are attained by standardizing, wherever possible, the sizes, shapes and construction details of reclamation jobs, so that once a jig is set up it can be used without alteration on a number of jobs. Such standardization also saves in the making of blueprints and expedites future repairs of the equipment.

The company has several equipment projects now under consideration, construction of which will require much reclaimed material. As in the past, what reclaimable material the refinery itself cannot furnish will be purchased from salvage yards. (An article in NPN's July 26 Technical Section, p. R-204, told how this company for its refinery construction program scoured salvage yards up to 1000 miles from Tulsa for old tanks, compressors, structural steel members, steel plate, etc., which could be worked up in its reclamation department, to save using new material—Ed).

Special process tower 50 ft. high containing specially designed plates, made from two old pressure stills and reclaimed plate. Tower weighs about 30 tons



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Two old 8 by 30 ft. shell pressure stills which will be fabricated into special process towers

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Two 9 by 25 ft. nearly new storage tanks which will be fabricated, with some additional materials, into a special process tower 95 ft. high, complete with specially designed plates

Converting Standard Compressors For Service in Butadiene Plants

● Gas compressors are scarce refinery equipment, yet the demand for them has greatly increased in the new wartime aviation gasoline and butadiene plants since relatively larger volumes of refinery gases are being processed. Accordingly, conservation of compressors is strongly urged by the War Production Board. Refiners are called upon to use idle and standby equipment wherever practicable, to convert standard air and gas compressors to service in the new plants, and to adopt all means to maintain compressors in most efficient condition.

The accompanying article, written by an authority on compressors in refinery service, gives refinery men practical suggestions on how to convert standard compressors to meet various conditions in butadiene plants, and lists the data on operating requirements which should be obtained to fit compressors on hand into use in the new plants—*Ed.*

By B. C. Thiel

IN THE main, compressors in butadiene plants are used to circulate 4 different types of gases: refinery gas, ethylene gas, ammonia gas and recycle gas. Usually the pressures encountered are well within the range for which the present day compressors are constructed.

Of the above gases, the only one that requires special material in the construction of the compressor is ammonia gas, unless the refinery gas to be compressed has not been stripped of its sulfur compounds before entering the compressor.

Changes Required to Handle Hydrogen Sulfide Gases

If the refinery gas to be compressed has been stripped of its sulfur content so that the sulfur measured as hydrogen sulfide is below 5 grains per 100 cu. ft., the standard gas compressor will be suitable for operation with this type of gas.

When the hydrogen sulfide content of the gas is greater than 5 grains and less than 1000 grains per 100 cu. ft. of the gas being compressed, it will be necessary to make the following changes in the compressor: All copper and copper bearing alloy parts such as copper asbestos gaskets and copper and brass lubricating oil lines and fittings that are in direct contact with the gas must be changed to stainless steel; the valve plates in the suction and discharge valves must be of stainless steel; and the piston rods must be of stainless steel.

When the hydrogen sulfide content rises above 1000 grains per 100 cu. ft. in the gas compressed, not only must the above changes be made, but the compressor piston and liner and the valve seats must be made of a corrosion-resisting cast iron.

Standard compressors have been operated on high hydrogen sulfide gases, but the maintenance cost on these compressors has been so enormous that the cost of installing a de-sulfuring plant has been spent in maintenance in a short time.

Converting the Compressor To Handle Ammonia Gas

In the construction of the ammonia gas compressors, which are used to produce refrigeration for parts of the butadiene manufacturing cycle, all aluminum, copper and copper bearing alloys—with the exception of monel metal—should be avoided. The reason for this is that the corrosive action of the ammonia gas upon the above mentioned metals will soon render parts made from them unfit for use. As these materials are generally used in the shape of copper asbestos gaskets and brass and copper lubricating oil lines and fittings, any ordinary gas or air compressor can be converted into an ammonia compressor by changing the copper asbestos gaskets to monel asbestos, stainless steel asbestos or armco iron asbestos gaskets. The lubricating oil lines can be made of steel tubing and the fittings for these lines of steel or malleable iron.

Although the continuous presence of liquid ammonia in the suction line of an ammonia compressor shows poor operation of the refrigerating system, this condition is sometimes momentarily unavoidable due to some operating upset. Therefore, it is imperative that a good liquid trap be installed in the suction line to prevent any liquid entering the ammonia compressor. In a standard ammonia cylinder, safeguards against this condition are built into the ammonia cylinder such as spring-held cylinder heads, so that a slug of liquid will not damage the compressor. But since a standard gas compressor is not so constructed, a slug of liquid will wreck the compressor.

Stainless steel piston rods and valve plates are sometimes used in ammonia compressors but they are a refinement that is unnecessary, as ordinary steel at these points will give life-long operation if properly cared for.

Two-stage ammonia compressor made from an old single-stage, low-pressure gas compressor in the reclamation department of the Mid-Continent Petroleum Corp. refinery. The required use of a special packing gland necessitated increasing the distance between the steam cylinder and compressor cylinder from 25 to 58 in., by means of forming 1-in. plate and welding on flanges and necessary stiffeners. A second-hand, high-compression cylinder was bought; the low-pressure cylinder is original equipment

Overcoming Problem Caused By Liquid in Gas Stream

Another difficulty sometimes encountered in operation on refinery gas is the entrainment of liquid hydrocarbons in the gas stream. This is caused by the condensation of the heavier fractions, some of which are carried over to the compressor. When this happens the affinity of these fractions to the lubricating oil will destroy the lubrication in the compressor cylinder and in the piston rod packing.

One way of combating this action is the use of a lubricant that is insoluble in liquid hydrocarbons, such as castor oil or a soap solution. There are also available lubricating oils blended with castor oil or other vegetable or animal oils that can be used, the degree of blending being dependent upon the amount of condensate in the gas being compressed.

The method used by some operators, that of over-lubricating the compressor cylinder, is detrimental to the operation of the compressor.

The idea back of over-lubrication is to feed so great a quantity of oil into the compressor that, even if some of the lubrication is destroyed, enough of it still remains to check excessive wear of the cylinder liner and piston rings. If it were possible to introduce the oil uniformly over the cylinder wall, this method might do some good. However, as the oil is introduced into the cylinder at not more than four points, generally two, the excess oil soon finds its way to the bottom of the cylinder bore and is blown out of the discharge valves that are generally located in the bottom half of a horizontal cylinder.

Over-lubrication causes an excessive deposit of oil on the discharge valves, which will in time carbonize on the valve seats and cause valve leakage, thereby destroying the efficiency of the compressor.

Over-lubrication will also cause carbon formation on the ribs of the plate valve seats, and if persisted in will soon choke the area through the seats enough to impair the operation of the compressor.

If the percentage of liquid is slight and solid metallic packing is used on the rod, piston rings and piston rod packing rings should be of some other material than the usual cast iron.

As cast iron is sensitive to lubrication and as the small particles worn off of the cast iron rings are in themselves an excellent abrasive, the use of a more ductile metal, such as a bronze or a material on the order of micarta or bakelite, will prolong the life of the compressor cylinder barrel or liner immeasurably.

If compressors are not equipped with a tail rod so that the compressor piston itself rides on the bottom of the compressor cylinder liner, a wearing band made of an antifriction metal, such as Allen Metal, can be installed at each end of the piston to prevent the cast iron of the piston rubbing on the cast iron of the liner.

Some operators install stoves or other heating devices around the suction line to the compressor to heat the incoming gas and vaporize any heavier ends that may be entrained in the gas stream. If this method is followed, the capacity of the compressor is reduced. The reason for this is that a compressor is a mechanism that will deliver a constant volume at certain pressure conditions, independent of temperature; and since heating the incoming gas will increase the volume of gas per pound, the actual amount of gas measured in pounds per specified length of time delivered by a compressor will be less at a high temperature than at a low intake temperature.

Naturally, the best way of attacking the above problem is to dehydrate the gas fed to the compressor so that dry gas only is compressed.

Compressors operating on ethylene gas can be of standard construction, as this gas, if pure, has no detrimental action on any of the materials used in the ordinary compressor The recycle compressors operate on that part of the mixed gases which has escaped combination in the catalyst and is gathered at the outlet of the catalyst chamber and re-introduced into it. There should be no difficulty in compressor operation on these gases provided the high enough temperature is maintained to prevent any condensation of the heavier ends that might be present.

Check Compressor Cylinders Against New Requirements

In new refining units, if the operator wishes to use compressor cylinders that he may have available, the following points should be checked:

(1) After the pressure against which the compressor is to operate is determined, the compressor cylinder should be checked against that pressure, either by the data on the name plate or by writing to the manufacturer.

(2) The horsepower necessary to drive the compressor when operating at the determined pressure conditions should be calculated or obtained from the manufacturer. When writing the manufacturer in regard to this data, give him the following information: suction pressure and temperature, discharge pressure and temperature, and an analysis of the gas to be compressed.

(3) In order to be sure that the compressor will deliver the required amount of gas, the capacity should be checked.

(4) The mechanical condition of the compressor cylinder should be thoroughly checked, especially the valves, piston rings and piston rod packing.

(5) If the cylinder is to be used for gases containing corrosive elements, all metals that these corrosive elements will injure should be removed and replaced with those that will resist the corrosion.

(6) The current requirements of motor driven compressors should be checked against the available current supply, to be sure of its suitability for the compressor in question.

In attempting to use any compressors that may be in stock, it is advisable to ascertain from the manufacturer of the power equipment whether the compressors can be mounted on the power units without having to design and fabricate any expensive adapters for them. The writer believes that, with a little Yankee ingenuity, a considerable portion of the now unused and partially obsolete equipment can be made to perform the same service as new equipment. Some of the makeshift equipment may not be streamlined, but it will operate to the satisfaction of the owner.

Reams can be written on maintenance, but every careful operator knows that, if the small misadjustments and misalignments are taken care of as soon as they appear, no major difficulties will arise. With the constant changing of personnel, all operators should see that the new men are thoroughly grounded in their work and placed with older men until they gain confidence in their ability.

Even though in some cases the instructions of the manufacturer seem to be unreasonable and call for equipment or supplies that seem to be more expensive at the time of purchase than the operator thinks necessary, it must be remembered that any equipment or supplies specified by the manufacturer have stood the test of time and continuous operation. Any manufacturer will be glad to inform the operator about the feasibility of using a piece of equipment, if the operator furnishes the manufacturer complete details of what work the equipment is supposed to perform.

Flyer Puts Navy and Cargo Ships in the Air

(*Continued from page R-250*)

ington may not already have turned to greater air fleets as pictured by Major de Seversky when WPB's Nelson cancelled the big new Higgins shipyard at New Orleans the other day and when he encouraged—even though allegedly non too strongly—that other famous shipbuilder, Harry Kaiser, to start planning big cargo air ships at his new yards on the Pacific coast.

There are other little whisps of straw in the wind which may also show how it is blowing.

If so, we of the oil industry should soon be noting it in increased orders from the government for motor fuel and lubricants, and in suggestions for larger refinery capacity.

But whether we see evidences of this change of plans tomorrow, it can only be but a short time when we will—when the refinery men of the country will be called upon to greatly increase the size of their present better-than-a-billion dollar construction job for butadiene, aviation gasoline and toluol.

Oil technical men will make those hydrocarbon molecules win this war, along with the aviation engineers and the daring flyers.

But read the major's book, a Book-of-the-Month-Club Book and published by Simon & Schuster, Inc., New York, and vision your refineries accordingly.

How Shell Saved 6000 H.P. of New Compressors In Expanding Aviation Gasoline Plants

● Faced with requirements under normal conditions for 6000 h.p. of compressors in building wartime refinery units, the ingenuity and resourcefulness of the engineering department of Shell Oil Co., Inc., made it possible to effect this plant expansion without buying a single new compressor, thus aiding greatly in the overall conservation of this refinery equipment. The oil company tells of the 4 conservation methods used, in an article written especially for NPN's monthly Technical Section— *Ed.*

By Shell Oil Co., Inc.

MAJOR difficulties in the procurement of adequate compressor equipment are being encountered by the petroleum industry in its present all-out war effort. The seriousness of this equipment shortage is better understood with the explanation that during normal peacetime the oil industry compressor demand was more than 300,000 h.p. per year. Production of war materials, including toluene, butadiene, and increased quantities of high grade aviation gasoline, has more than doubled this peacetime need.

This increased demand has occurred at a time when compressor availability has been greatly reduced by the generally increased offtake in all industries. Expansion of compressor manufacturing facilities has not been able to keep pace with the increased demand, with the result that six months to a year is required for delivery of new compressors.

The government early recognized the probability of serious shortages of gas compressors and the Equipment Procurement Section, Refining Division, Office of Petroleum Coordinator, adopted constructive methods for minimizing new compressor requirements.

Shell Oil Co., Inc., now engaged in a major construction program, has put some of these methods into use with such effectiveness that their experience, as related here, might be of benefit to the entire industry.

Shell's new building program on the Pacific Coast, designed to increase greatly the production of 100-octane aviation gasoline for the government, would have required a total of 6000 h.p. of compressors under normal conditions. Study by Shell along the lines directed by OPC has reduced this overall requirement to such a point that it will now be possible to accomplish this expansion without the purchase of a single new compressor.

Methods Employed

The methods followed in reducing compressor requirements were as follows:

1—Survey of all available idle equipment and substitution of such equipment in place of new compressors.

2—Substitution of an ammonia absorption system for propane compression refrigeration originally considered.

3—Cooling and partial condensation of the cracking plant final vapor product in order to minimize the volume to be compressed.

4—Establishing equilibrium after each stage of compression between compressed vapors and total condensate in the system.

Some details regarding each method may prove useful:

Survey of all Available Idle Equipment. This survey was designed primarily to list idle equipment available. It was extended to include spare equipment in order that all compressor equipment could be used in full operation. Those compressors available for sale to other companies have been tabulated and the list made available throughout the oil industry.

Consideration was given not only to equipment now available, but to equipment which may become available by shutdown of plants within the next 8 months, as this would provide such equipment by the time compressors would be required for the construction of the new plant.

Conversion of existing compressors to new service requires in most cases new cylinders and miscellaneous parts and the government has guaranteed adequate priority to assure required delivery of these parts.

Substitution of an Ammonia Absorption Plant. Although propane compression has been used in the past for refrigeration of similar units, a study was made to determine the suitability of other methods of refrigeration which would not involve the use of a large number of compressors. In this specific case, where a plant required approximately 1800 tons of refrigeration, it was finally decided to substitute the ammonia absorption system of refrigeration on the basis that no compressors would be needed under this alternative. This decision was made despite the fact that, in this case, operating costs for the ammonia absorption system are appreciably higher than for propane compression.

Cooling of the Cracking Plant Product. In the compression of low pressure product gases preparatory to absorption and fractionation of liquid products, the volume of gases to be compressed depends upon the volume prior to compression. Obviously, there is an economical point below which, from an operating point of view, it does not pay to cool these vapors. However, by reducing this temperature to a still lower point it is possible still further to minimize compressor requirements. In the case in point, this added cooling accomplished a reduction of 35 h.p.

Establishing Equilibrium After Each Stage of Compression. In multi-stage compression of process vapors, the compressed vapors from the first stage are normally passed through an intercooler before admission to the second stage of the compressor, the condensate from the first stage discharge being removed from the intercooler continuously. A reduction in the quantity of vapor passed to the second stage may be realized if the first stage compressor discharge vapors are brought to equilibrium with the liquid from the accumulator from which the compressor takes suction.

In this specific case, it is necessary to increase pressure on the total material from the primary accumulator (from which the compressors take suction). The vapors from the first stage compressors may be cooled and brought to equilibrium with the liquid from the primary accumulator, resulting in a reduction of 11% in the quantity of uncondensed vapors to be handled by the second-stage compressors. Such a procedure required the installation of a second large accumulator, pumps and lines, but effected a definite compressor saving of 180 h.p.

These are only a few of the expedients which may be used and they are shown to indicate what has been accomplished in an actual case. As may be seen, some of the methods involved decisions permanently affecting operations, whereas others involved temporary makeshifts which may be improved when needed materials become more readily available.

War Emergency Specifications are Proposed For Refinery Bolting to Conserve Alloys

IMPORTANT changes in the composition of steels used in refinery bolting material have been proposed by the M. W. Kellogg Co., refinery engineers, to conserve the alloy and high strength steels for war needs.

The proposals, announced in the latest Wartime Plant Design bulletin of Max B. Miller, chief of the procurement section of the Office of Petroleum Coordinator's refining division, call for wider use of carbon steels in bolts, studs and nuts. They also suggest some of the new alternate National Emergency (NE) steels recently announced by the American Iron & Steel Institute as substitutes for low chromium and nickel steels in many bolting applications.

The emergency specifications of this company also call for basing the temperature requirements of bolting material on the actual metal temperatures, rather than on temperature of the oil or gas in the piping and vessels. The specifications present a formula for estimating the design bolting temperature in percent of flow temperature under various conditions of insulation of piping or vessels.

These proposals of the refinery engineering concern for conserving the nation's supply of alloy and high strength steels have been presented before committees of the American Petroleum Institute and the American Society of Mechanical Engineers who are considering the emergency requirements for steels for piping and pressure vessels. They are also under consideration by the Iron & Steel Division of the War Production Board.

Saves Chromium, Nickel

While requirements for steel for bolting material are only a small percent of structural steel used in new plants, heavy replacements in the present era of repairing and salvaging equipment will make bolting material an important item among refiners' needs. Thus the refiner specifying only to meet his actual operating requirements will aid in conserving the strategically important chromium and nickel alloys for actual military needs.

"Now that the first and principal step has been taken toward simplifying and reducing alloy consumption for valves, fittings and pipe which comprise the principal part of oil refinery piping tonnage," W. W. Diener of the Kellogg Company wrote Procurement Section Chief Miller, "we believe it is an opportune time to give attention to the conservation of alloys in bolting material". His letter goes on to point out that the established practice among petroleum refiners has been to call for types of bolts, stud-bolts and studs heavier than actually required and composed of material which in most cases would far more than withstand all anticipated service requirements. Alloy steels have been used where carbon steel would meet all needs.

This method of specifying eliminated extra work in engineering and ordering. It also helped customers' interests in reducing the types of bolts necessary to carry in stock, and prevented confusion in the use of materials. Nevertheless, the Kellogg company official stated, the war emergency need to conserve steel makes necessary a change in this purchasing policy.

Practice among refiners, he stated, has been to use mild alloy steels for bolts for pipes and pressure vessels in all applications from -75 F. to 900°F.; higher alloy for temperatures up to 1200°F. and carbon steel bolting material has been restricted to cast iron flanges.

The types of steel bolts and studs specified by the M. W. Kellogg Co., including the emergency types, are as follows:

CARBON STEELS

Type "A": For structural purposes, also for piping in connection with cast iron fittings.

Type "AA": Conforms to requirements for A.S.M.E. and A.P.I.-A.S.M.E. unfired pressure vessel codes. It is suitable for pressures of 160 psi. max. and temperatures of 450°F. max.

Type "AAA" (new emergency): Meets requirements of A.S.T.M. Specification A-96-39. Class A,* except that the material shall be a medium carbon steel of the S.A.E. 1000 series. with 0.10% minimum silicon content and a maximum draw temperature of 1000°F. If carbon steel is not readily available, any low alloy steel conforming to any of the 3 specifications of A.S.T.M. Specification A-96-39 will be equally acceptable.

Commenting on the properties of this alternate carbon steel, the company stated: "This introduces a medium carbon bolting steel of the S.A.E. 1000 series containing sufficient carbon so that, when heat treated and tempered at 1000°F., Class A physical properties to A.S.T.M. Specification A-96-39 can be obtained.

"Class A physical properties provide a sufficiently high yield point to permit setting the gaskets on any of the conventional types of facings used for oil refinery piping. We have in mind S.A.E. 1040, or possibly S.A.E. 1045 steel, which of course completely eliminates alloy content and yet provides a bolt-

Table No. 1—Compositions for Alternate War Emergency Steels For Type "B" Refinery Bolting Material

Material B-7 preferred. Other materials listed to be furnished when specifically ordered, or on approval when B-7 is not available.

Analysis Symbol	B-7	B-4	B-11	B-12	B-33
Identifying Mark	7	4	11	12	33
Description	S.A.E. 4140	S.A.E. 4340	Tung-Chr-Vanad.	S.A.E. 3140	Heppenstall C-55
Carbon—%	.35-.45	.35-.45	.40-.50	.35-.45	.50-.58
Manganese—%	.60-.90	.50-.80	.20-.40	.60-.90	.50-.80
Phosphorus—% Max.	.04	.04	.04	.04	.04
Sulfur—% Max.	.05	.05	.04	.05	.04
Silicon—%	.15-.30	.15-.30	.15-.30	.15-.30	.15-.30
Chromium—%	.80-1.10	.50-.80	1.0-1.5	.45-.75	.50-.80
Molybdenum—%	.15-.25	.30-.40			.15-.25
Nickel—%		1.5-2.0		1.0-1.5	1.0-1.5
			Tungsten 1.7-2.3		Vanadium .12 Max.
			Vanadium .20-.30		
Heat Treatment			M.D.T. 1000°F.		
Min. U.T.S.			125,000 lbs./sq. in.		
Yield Point Min.			105,000 lbs./sq. in.		
Elong. in 2" Min.			16%		
Red. of Area Min.			50%		

*See Pg. 355, A.S.T.M. Standards 1939, Part 1: A.S.T.M. Specification A-96-39 covers alloy bolting material for pressure vessels, valves, flanges and fittings for high temperature service. Three classes of material are covered, selection to depend on design stresses and service for which material is to be used. Chemical composition for all classes: phosphorus, max.% 0.045; sulfur, max.% 0.05. Composition, other than phosphorus and sulfur to be agreed upon by manufacturer and purchaser. Recommended that carbon content be not less than 0.20% nor more than 0.40% and that the carbon ranges shall be 0.10% of carbon. Tensile strength and Brinell hardness tests given for each class.

ing material which should prove acceptable on 80% or more of refinery piping.

"However, to make this substitution operable, it would be necessary for the War Production Board to make it possible or even mandatory for the mills, warehouses and bolting manufacturers to stock the series 1000 analysis selected as a standard material."

ALLOY STEEL

Type "AAB" (new emergency): Covers stud bolts and studs furnished to requirement of A.S.T.M. Specification A-96-39, either Class B or Class C. Material shall be manganese steels of S.A.E. 1300 series or available low alloy steel capable of meeting these physical properties with a minimum draw temperature of 1000°F. In addition, it is required that the minimum annealed ultimate strength shall not be less than 80,000 psi.

This type, the company states, is to fill the gap below Type "B" by providing a classification for bolting materials similar to present analysis but of lower alloy content, and possibly for other analyses which make use of non-strategic alloys. As a suggestion for the latter, the use is proposed of manganese steel of the S.A.E. 1300 series with heat treatment to A.S.T.M. Specification A-96-39, Class B or C physical properties.

Type "B": For temperatures from -20°F. to 900°F. for use with austenitic materials limited to low temperature service. Compositions for steels meeting these specifications are given in Table 1. It is also stated that the following National Emergency steels shall be considered acceptable for this type of bolting material: NE-8339, NE-8442, NE-8447, NE-8739, NE-8744.**

Type "C": For temperatures from -20°F. to 1200°F. See accompanying Table No. 2 for composition of low-alloy steels meeting requirements for this type. It is also stated that the following National Emergency steels shall be considered acceptable alternates for Type "C" material: NE-8547, NE-8949.

Type "D": For use with flanges of austenitic steel (18-8, 25-12, 25-20, etc.) pressure parts. See Table 3 for composition of acceptable steels for these requirements.

Type "L": For temperatures from -20°F. to -75°F. See Table 4 for compositions of acceptable material.

Type "M": For temperatures below -75°F. See Table 4 for compositions of acceptable steels.

Type "P": For corrosion and heat resistant structural services. See Table 5 for composition of acceptable materials.

The application of the various types of

**See Technical Section, July 29 National Petroleum News, Page R-201, for compositions of the National Emergency steels and description of their proposed uses in the oil industry.

Table No. 2—Compositions for Alternate War Emergency Steels For Type "C" Refinery Bolting Material

All materials listed hereunder are equally acceptable, for selection by the manufacturer, unless a specific material is ordered.

Analysis Symbol	B-5	B-7a	B-13	B-14	B-15	B-31	B-34
Identifying Mark	5	7a	13	14	15	31	34
Description	4-6% Cr-Mo.	S.A.E. 4140 ½% Mo.	Beth. Super-Temp.	Cr-Mo. Vanad.	Timken DM 45	2% Cr-Mo.	Heppenstall 2C-30
Carbon—%	.35 Max.	.35-.45	.30-.40	.35-.50	.40-.50	.35 Max.	.25-.35
Manganese—%	.30-.50	.60-.90	.60-.90	.40-.70	.40-.70	.30-.50	.50-.80
Phosphorus—% Max.	.03	.04	.04	.04	.03	.03	.04
Sulfur—% Max.	.03	.05	.04	.05	.03	.03	.04
Silicon—%	.50 Max.	.15-.30	.15-.30	.15-.30	.50-.80	.50 Max.	.15-.30
Chromium—%	4.0-6.0	.80-1.10	.45-.75	.80-1.10	1.0-1.5	1.75-2.25	.50-.80
Molybdenum—%	.45-.65	.45-.65	.40-.65	.30-.40	.40-.60	.45-.65	.40-.50
Nickel—%							1.5-2.0
			Tungsten .85-1.35	Vanadium .20-.30			Vanadium .12 Max.
Heat Treatment			M.D.T. 1200°F.				
Min. U.T.S.			125,000 lbs./sq. in.				
Yield Point Min.			105,000 lbs./sq. in.				
Elong. in 2" Min.			16%				
Red. of Area Min.			50%				

Table No. 3—Compositions for Alternate War Emergency Steels For Type "D" Refinery Bolting Material

Preferred materials are KA2S Studs.
Other materials are to be used with approval of the Engineering Dept.

Analysis Symbol	B-41	B-8	B-42	B-40	B-39	B-43	B-44
Identifying Mark	41D	8D	42D	40D	39D	43D	44D
Description	KA2	KA2S	KA2SCb	25-12	25-20	8-18	8-18
Carbon—%	.08-.20	.08 Max.	.12 Max.	.20 Max.	.25 Max.	.25 Max.	.25-.55
Manganese—%	.20-.75	.20-.75	2.00 Max.	2.00 Max.	2.00 Max.	.20-.90	.20-.90
Phosphorus—% Max.	.035	.035	.035	.035	.035	.035	.035
Sulfur—% Max.	.035	.035	.035	.035	.035	.035	.035
Silicon—%	.75 Max.	.75 Max.	.75 Max.	2.00 Max.	2.00 Max.	1.50 Max.	1.50 Max.
Chromium—%	17.0-20.0	17.0-20.0	17.0-20.0	22.0-26.0	22.0-26.0	7.0-10.0	7.0-10.0
Molybdenum—%							
Nickel—%	7.0-10.0	7.0-10.0	8.0-12.0 Cb. 10 x % C	11.0-15.0	18.0-22.0	19.0-23.0	19.0-23.0
Min. U.T.S.	80,000 psi	75,000 psi	75,000 psi	75,000 psi	75,000 psi	75,000 psi	100,000 psi
Yield Point Min.	30,000 psi	30,000 psi	30,000 psi	30,000 psi	30,000 psi	30,000 psi	50,000 psi
Elong. In 2" Min.	35%	35%	35%	35%	35%	35%	30%
Red. of Area Min.	50%	50%	50%	50%	50%	50%	50%

Table No. 4—Compositions for Alternate War Emergency Steels For Types "L" and "M" Refinery Bolting Material

	The M. W. Kellogg Co.—Type "L" Material B-7 preferred. Other material to be furnished when specified.		The M. W. Kellogg Co.—Type "M" All materials listed hereunder are equally acceptable for selection by the manufacturer, unless a specific material is ordered.		
Analysis Symbol	B-7	B-4	B-35	B-37	B-38
Identifying Mark	7L	4L	35M	37M	38M
Description	S.A.E. 4140	S.A.E. 4340	S.A.E. 2320	S.A.E. 3130-3135	S.A.E. 4640
Carbon—%	.35-.45	.35-.45	.15-.25	.25-.40	.35-.45
Manganese—%	.60-.90	.50-.80	.30-.60	.50-.80	.50-.80
Phosphorus—% Max.	.04	.04	.04	.04	.04
Sulfur—% Max.	.05	.05	.05	.05	.05
Silicon—%	.15-.30	.15-.30	.15-.30	.15-.30	.15-.30
Chromium—%	.80-1.10	.50-.80		.45-.75	
Molybdenum—%	.15-.25	.30-.40			.20-.30
Nickel—%		1.5-2.0	3.25-3.75	1.0-1.5	1.65-2.0
Heat Treatment	M.D.T. 1200°F.			M.D.T. 1100°F.	
Min. U.T.S.	105,000 lbs./sq. in.			105,000 lbs./sq. in.	
Yield Point Min.	80,000 lbs./sq. in.			80,000 lbs./sq. in.	
Elong. in 2" Min.	20%			20%	
Red. of Area Min.	50%			50%	

Table No. 5—Compositions for Alternate War Emergency Steels For Type "P" Refinery Bolting Material

Manufacturer shall furnish specific grade of material ordered. High Sulfur, Free-machining grades of these materials suitable only where elevated temperatures are not involved and may be substituted only on approval.

Analysis Symbol	B-5	B-6	B-8	B-39	B-40
Identifying Mark	5P	6P	8P	39P	40P
Description	4-6% Cr-Mo.	S.A.E. 51210	S.A.E. 30905 (18-8)	25-20 Cr-Ni.	25-12 Cr-Ni.
Carbon—%	.35 Max.	.12 Max.	.08 Max.	.15 Max.	.20 Max.
Manganese—%	.30-.50	.60 Max.	.20-.70	.50-.70	1.25 Max.
Phosphorus—% Max.	.03	.03	.03	.035	.030
Sulfur—% Max.	.03	.03	.03	.035	.030
Silicon—%	.50 Max.	.50 Max.	.75 Max.	.70-1.5	.50 Max.
Chromium—%	4.0-6.0	11.5-13.0	17.0-20.0	24.0-26.0	22.0-26.0
Molybdenum—%	.45-.65				
Nickel—%			7.0-10.0	19.0-21.0	11.0-13.0
Heat Treatment		Anneal			
Min. U.T.S.	75,000 psi	60,000 psi		75,000 psi	
Yield Point Min.	30,000 psi	30,000 psi		30,000 psi	
Elong. in 2" Min.	30%	25%		35%	
Red. of Area Min.	50%	50%		50%	

bolting shown above is described as follows in the emergency supplement to steel bolting material specifications of the M. W. Kellogg Co.:

Piping Flanges and Tower Nozzles

(a) **Type "A"** bolting shall be used for all cast iron flanges.

(b) **Type "AA"** bolting shall be used for all carbon steel Series 15 A.S.A. flanges where the bolt temperature does not exceed 450°F. and may be used for special carbon steel flanges within this temperature range.

(c) **Type "AAA"** bolting shall be used for carbon steel A.S.A. flanges, Series 30 and higher, and especially designed carbon steel flanges where the bolt temperature does not exceed 900°F. This temperature is equivalent to a flow temperature of 950°F. where using integral flanges, fully insulated externally. Type "AAA" bolting shall be used for Series 15 flanges where the bolt temperature exceeds 450°F.

(d) **Type "B"** bolting shall be used for all carbon steel flanges where the bolt temperature exceeds 900°F., equivalent to a flow temperature of 950°F. where using integral flanges, fully insulated externally.

(e) **Type "B"** bolting shall be used for all carbon 0.5% molybdenum flanges.

(f) **Type "B"** bolting shall be used for all chromium alloy flanges where the bolt temperature does not exceed 900°F.

(g) **Type "C"** bolting shall be used for all chromium alloy flanges where the bolt temperature exceeds 900°F.

(h) **Type "D"** bolting shall be used for all flanges of austenitic material (18-8, 25-12, 25-20 etc.) except where the austenitic material is used for corrosion resistance only and the bolt temperature does not exceed 450°F.

(i) The Pressure Equipment & Materials Division shall be consulted in all cases where bolting material of **Types "L", "M" and "P"** is contemplated.

Tower Manholes

(a) **Type "AA"** bolting shall be permitted for infrequently opened manholes for pressures up to 250 psi. where a soft gasket is used and the bolt temperature does not exceed 450°F.

(b) **Type "AAA"** bolting shall be required for all manholes except as noted in (a) above, where the bolt temperature does not exceed 900°F.

(c) For special cases, the Pressure Equipment & Materials Division shall be consulted.

Exchanger Flanges

(a) **Type "A"** bolting shall be used for all cast iron flanges.

(b) **Type "AA"** bolting shall be used for all carbon steel Series 15 A.S.A. flanges.

(c) **Type "AAA" or "AAB"** bolting shall be used for all flanges where the bolt temperature does not exceed 900°F., except as covered in (a) and (b) above.

Specially Designed Flanges

(a) Where carbon steel flanges are designed for bolt temperatures not exceeding 900°F., the design shall be based on Type "AAA" bolting.

(b) The design of other special flanges shall follow the principles set forth under Piping Flanges and Tower Nozzles (above).

Internal Structural Bolts

(a) Except where alloy material is essential for corrosion resistance type "AA" bolting shall be used for low stressed structural bolting such as holding down bolts for trays, etc.

Allowable Stresses

(a) The allowable stresses to be used in the design of bolting are given on sheet XI-3-1-NE2-1 (See Fig.1).

Allowable Stresses for Bolting Materials

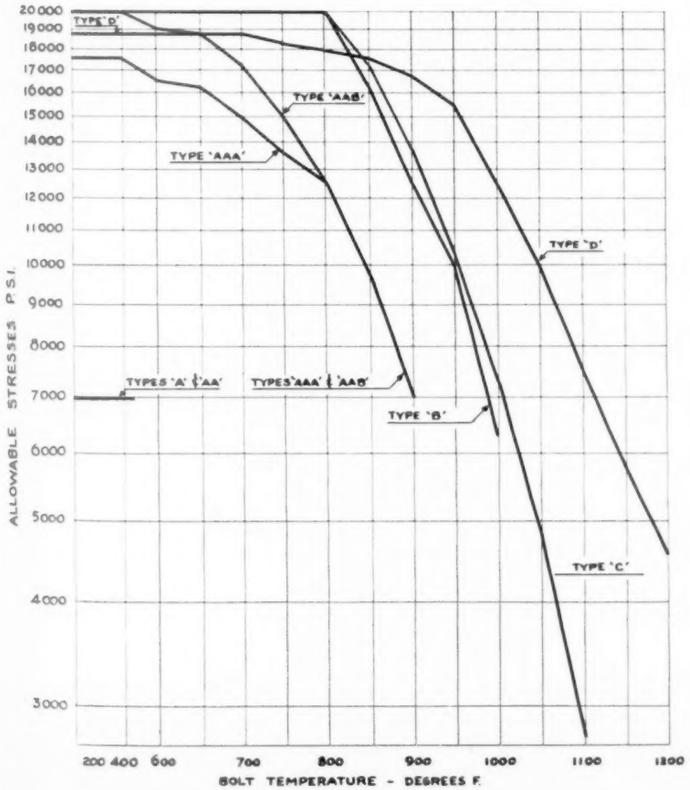


Fig. 1—Allowable stresses to be used in the design of bolting for refinery piping and vessels

Bolt Temperatures

The emergency specifications of the M. W. Kellogg Co. for steel bolting material provide the following means for estimating the design metal temperatures of bolts and studs, in percentage of the flow temperatures for which piping and pressure vessels are designed:

For the usual run of piping and vessels which are uninsulated internally and exposed to atmospheric temperatures on the outside, the design temperature of the bolts shall be taken as the following percentage of the flow temperature:

For Integral Flanges

Where fully insulated externally	95%
Where lightly insulated (maximum of 0.5 in. of plastic) and covered with a weathershield permitting air circulation	90%
Where uninsulated and covered with a weathershield permitting air circulation	80%

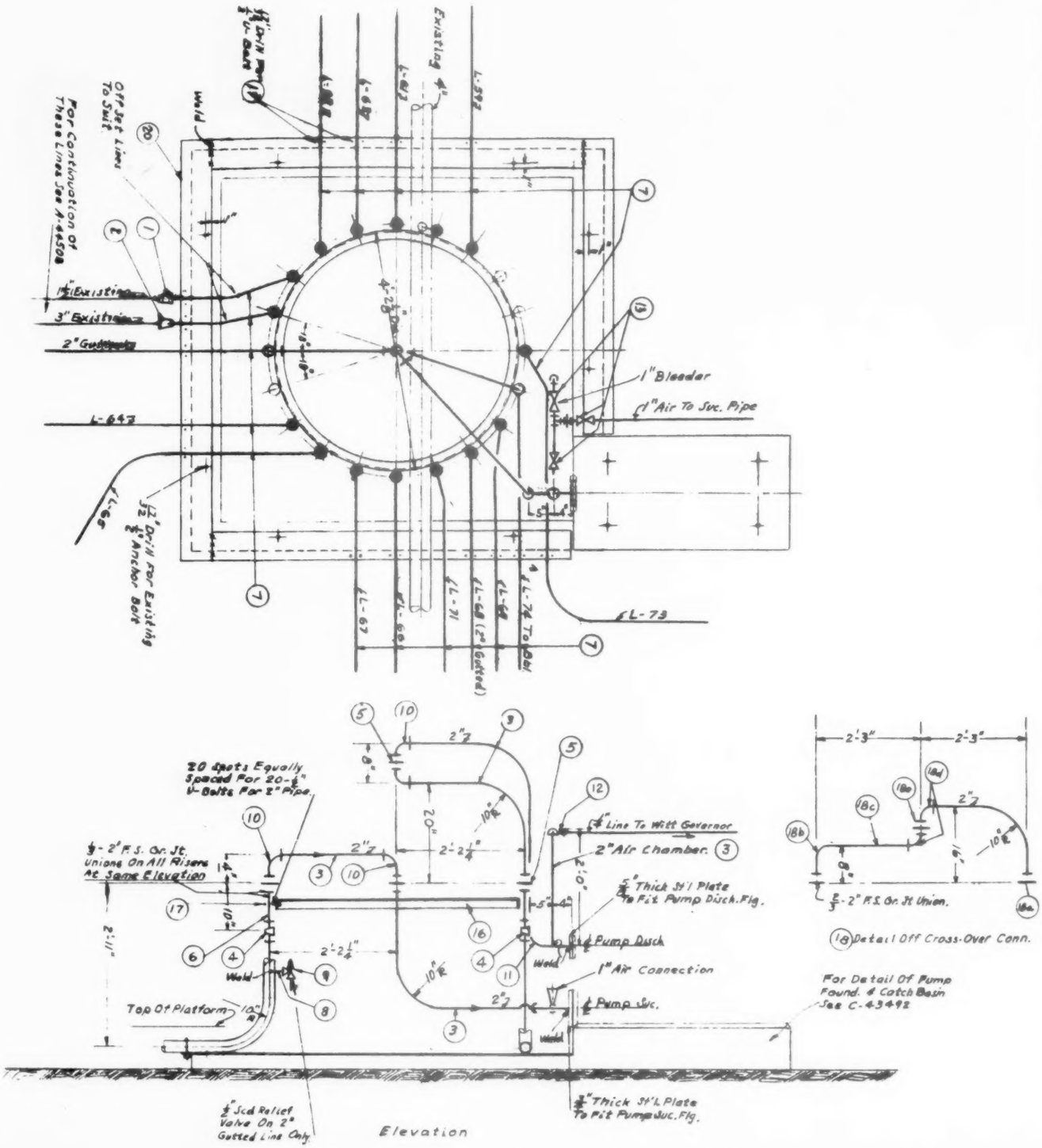
For Van Stone Flanges:

Where fully insulated externally	90%
Where lightly insulated (maximum of 0.5 in. of plastic) and covered with a weathershield permitting air circulation	85%
Where uninsulated and covered with a weathershield permitting air circulation	75%

For internally insulated piping or vessels, the design metal temperature established in each individual case by the Pressure Equipment & Materials Division shall be converted into an equivalent (internally uninsulated) flow temperature by dividing it by .975, whereupon the percentages given above can be applied to obtain the design temperatures of the bolts.

For setting the design temperature of the bolts for piping inside of vessels or enclosed in header boxes, or for other special conditions, the Pressure Equipment & Materials Division shall be consulted.

How to Design a Materials-Saving War Refiner



Design sketch of new radial type refinery manifold

ner[anifold

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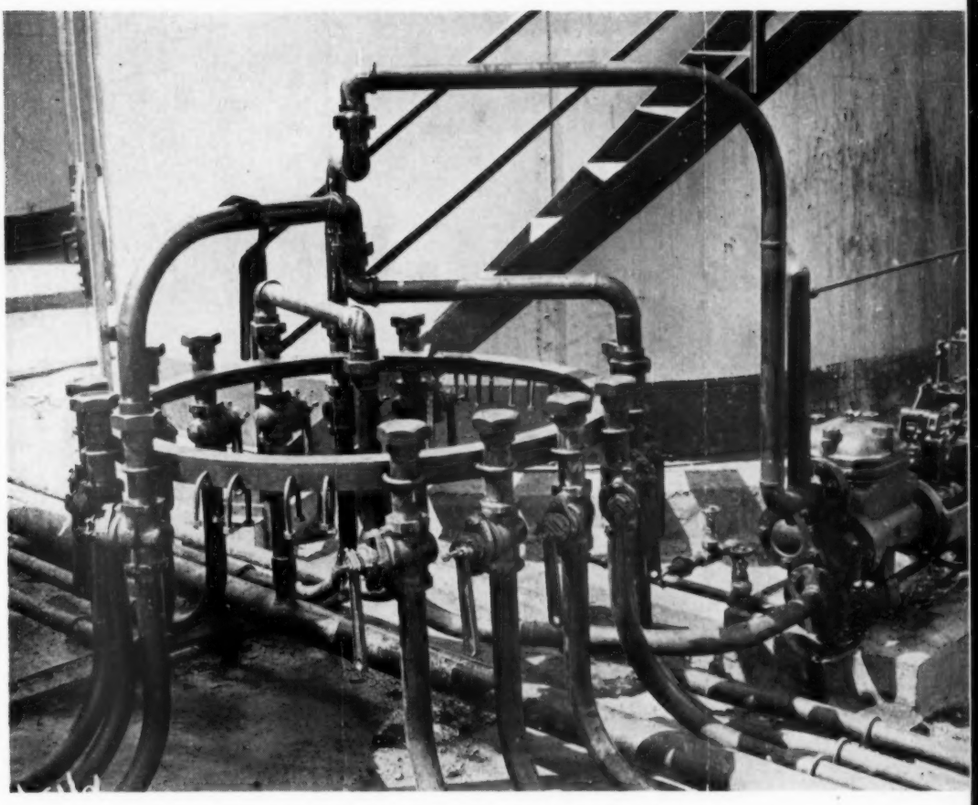
WAR REFINING ARTICLE



Radial type manifold designed to conserve materials

INSTRUCTIONS needed to design the new type of radial manifold described in the latest bulletin on Wartime Plant Design of the procurement section of the Office of Petroleum Coordinator's refining division are given in the accompanying layout sketch, photograph, and list of materials used.

This type of manifold—developed by Standard Oil Co. of California for use with refining units handling a number of grades of stocks—takes less valves, piping and other material than the ordinary square blinded type of manifold. Among modifications of the design is the use of flanged valves in larger pipe sizes. Advantages of this type of manifold are listed by the oil company as follows:

1—By installing one or more cross-over connectors between pairs of spots on the manifold, several operations may be conducted over the manifold simultaneously. The connectors permit the flow of stock through the manifold, or the washing of lines, without interfering with the manifold pump connections.

2—Only one valve is required per line instead of two. Rising stem valves are not necessary, as the hook-up of connectors is apparent at a glance. Also, if one connecting line to a square manifold handles stocks requiring an alloy valve, every valve in the manifold has to be of that material, whereas with a radial manifold only those lines carrying the stock require the special valve.

3—Valve servicing and replacement costs are reduced because there are only half as many valves. If corrosive stocks are being pumped, only the valves on the lines carrying the corrosive stocks are subjected to corrosion.

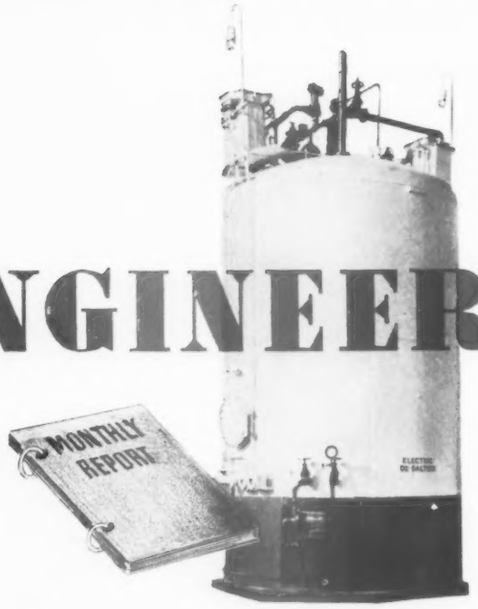
4—Less time is required for lining up the radial manifold for pumping because it is simpler to break unions than to change blinds in crowded locations.

5—Lines can be added or removed and valves serviced with little difficulty because individual lines can be worked on without disturbing the rest of the manifold.

List of Materials Needed for New Radial Type Manifold

No. on Sketch	Number Required	Description
1	1	2-in. by 1.5-in. standard seamless steel eccentric welding reducer.
2	1	3-in. by 2-in. standard seamless steel eccentric welding reducer.
3		Lineal ft. 2-in. standard seamless steel pipe.
4	15	2-in., 125-lb., semi-steel screwed lubricated plug cock with standard wrenches.
5	17	2-in. forged steel, ground joint unions.
6	15	2-in standard seamless steel pipe nipple, 7 ins. long, threaded at both ends.
7	16	2-in. seamless steel pipe, random length, with 12.75-in. tangent at one end with standard pipe thread, followed by bend with a 10-in. radius. Other end to be threaded.
8	1	0.5-in. extra heavy seamless steel pipe, 3 in. long, threaded at one end only.
9	1	0.5-in. screwed relief valve.
10	18	2-in., 125-lb. malleable iron screwed 90 deg. street elbows.
11	1	2-in. standard seamless steel 90 deg. welding elbow.
12	1	0.25-in. extra heavy seamless steel pipe, 3 ins. long, threaded at one end only.
13	3	1-in. standard screwed gate valve.
14	1	1-in. standard malleable iron screwed tee.
15	1	1-in., 250-lb. malleable iron railroad union.
16	1	2-in. by 2-in. by 0.25-in. steel angle, 13 ft. 2 ins. long.
17	30	0.5-in. U bolt for 2-in. pipe.
18	1	Cross-over connection.
18 (a)	2	2-in. forged steel ground joint unions.
18 (b)	1	2-in. standard seamless steel 90 deg. welding elbow.
18 (c)	1	2-in. standard seamless steel pipe 22.5-ins. long, threaded at one end only.
18 (d)	2	2-in., 125-lb. malleable iron screwed 90 deg. street elbow.
18 (e)	1	2-in. forged steel ground joint union
19		Union cap.
20	22	Lineal ft. 0.25-in. thick by 6 ins. wide steel plate.

The ENGINEERS Report



Below are excerpts from reports turned in by Petreco Desalting engineers. Refinery men will understand why names and places are not included. They also will find that some of the facts reported are of considerable interest.

Corrosion

From a Kentucky installation a Petreco engineer reports: "The oustanding features of desalting at this refinery are: decreased ammonia cost, higher solubility of asphalt, increased length of run of the cracking plant, less HCl formed, consequently less corrosion."

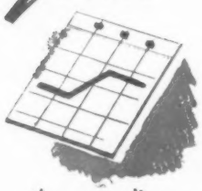
Temperature

A Gulf Coast engineer reports: "Experience during ten years operation (before desalting) had shown the operators that if they kept this temperature (a reduced crude furnace) above 905°F. the still would coke up. Beginning last summer they raised this temperature a degree at a time, and find they can operate at 915°F. without coking, and still operate for 2500 hours."

Referring to a Michigan refinery: "They no longer have trouble in obtaining a clear thirty-plus color on their kerosene. Previous to the desalter installation, their kerosene showed a brown cast almost all the time, and was not crystal clear, as it is when desalting. Also, previous to desalting, they had some trouble with a white deposit on the lamp chimney during the burn tests. This trouble has been practically eliminated. Their chemist also says that the naphtha cut is improved as to odor."

Kerosene

Yield



Another Gulf Coast report: "Mr. ——— has told me that the extra temperature (since desalting) has increased the gasoline recovery from the still over 0.5% . . . the yield is increased about 1500 gals./day of cracked gasoline. . . ."

Time on Stream

An engineer in Kansas reports: "This plant has completed 77 days of continuous operation, and present indications are that a shut down is not anticipated before the 15th or 16th of this month. The management is quite pleased with the record run, and *due credit is given to the desalter for making it possible.* Of course, this is not a record run of record runs, but it is the longest run ever made in this district of which a record can be found."

These excerpts are not offered as testimonials . . . they are simple facts, lifted from routine letters and reports, yet they point directly at many refinery problems. It will pay you to remember that Petreco engineers are always available for consultation on your salt problem . . . why not get in touch with one now?

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New Processes Bring Pumping Problems In the Wartime Refining Plants*

739.23

By Drew T. Whiting** and K. P. Hurley**

• The new processes being installed to make aviation gasoline, butadiene, toluene and other essential petroleum products for war service have increased service requirements on refinery pumps. For processing units where sulfuric acid, hydrogen fluoride and other acids are used, changes in design of pumps and careful selection of material for parts coming in contact with the acid have been required.

Pumps of the type originally designed to recycle hot oil in thermal cracking plants in some cases now have to handle large volumes against much higher heads. Even boiler feed pumps frequently have to work against higher pressures under present conditions, it is pointed out.

THE most severe refinery pumping problem 12 years ago was to recycle hot oil through cracking coils. A great amount of money and research were required to produce reliable pumps for this duty. Good results were obtained by manufacturers and by the middle '30's satisfactory pump operation was considered commonplace. Perfection of details followed and fine pumps were produced. At the peak of this pump development, refineries began to change to great chemical plants, and the market for high pressure hot oil pumps began to disappear. It seemed that they would have no place in the refinery of the future. This did not turn out to be true, as services requiring such pumps did develop, as will be mentioned later.

New terms began to appear—catalytic cracking, thermal alkylation, sulfuric acid alkylation, isomerization, polyform, powdered catalyst, thermofor, hydroformer, hydrogen fluoride alkylation, toluene, butadiene, styrene, copolymerization, and many others straight from the chemistry book. The authors make no pretense of understanding all these manifestations of organic chemistry in action, but have had some experiences with the pumps required for these new operations.

Certain catalytic cracking plants brought with them new problems, some of them so novel as to require pumps of totally new design unlike anything ever before seen in a refinery. The circulation of molten salts in large quantities (600 to 17,000 G.P.M.) against low heads (40 to 75 ft.) could not be handled by conventional pumps. A vertical pump of axial or mixed flow was a perfect solution, and structural problems were soon solved. Fortunately, no new metallurgical problems had to be considered, and these pumps are now more or less standard products.

The other pumps required are of conventional refinery design, but one innovation in refinery practice is the use of large centrifugal blowers driven by hot gas turbines or steam turbines. These are high horsepower machines running at speeds which make the high speed pump (3600 R.P.M.) seem to stand still. The first of these blowers were built in Switzerland, but they are now made in this country. In some plants, reciprocating compressors perform the same function.

Must Handle Sulfuric Acid

Some of the first alkylation plants employed hot sulfuric acid and this presented severe problems, mainly concerned with packing. Pumps were designed to reduce pressure on the packing to the minimum possible, and deep boxes were needed. Spun glass packing, lubricated by injected butane, worked out well. In recent plants, the acid-hydrocarbon mixture is pumped cold. Special pumps with very deep boxes were still needed and a new problem appeared.

At the beginning of the cycle, the pure acid had to be pumped, with more and more thinning out by addition of hydrocarbons and increased temperature as the run progressed. This meant a change from high to low viscosity, and required great care in sizing drivers, to prevent overloads during the first part of the operation.

Because of the great changes in load, steam turbine drivers were favored as variable speed was desirable. No particular metallurgical problems appeared; all iron pumps offer excellent resistance to the action of the acid. However, safety regulations in many plants required steel pump casings for acid hydrocarbon mixtures having vapor pressures higher than atmospheric. This precaution was to provide greater safety in case of fire; water sprayed upon a hot cast iron casing might cause it to crack open, diffusing its contents over a wide area in gaseous form. In similar circumstances the steel casing would become plastic and deform but would not break open. Steel does not resist the acid as well as cast iron, but safety is more important than longer wear.

Stuffing Box Design Changed

Anhydrous hydrogen fluoride is used in certain new alkylation plants, and one of the most vital requirements of proper pump design is that the acid be prevented from coming in contact with the packing. Various designs of stuffing boxes have been proposed, all of them relying upon injection of alkylate or similar material ahead of the packing and at higher pressure than that existing at the entrance to the stuffing box.

The maintenance of this pressure differential is too important to depend upon hand adjustment. A control system should be provided so that the injected material will always flow into the pump. It is also a good idea to inject a lubricant into the packing as the sealing liquid is quite dry. Mechanical sealing devices, using no packing, have been suggested and will probably be tried, but the process is relatively new and it will be some time before complete data is obtained.

Cast iron also stands up well under the action of anhydrous HF, or HF-hydrocarbon mixtures, and carbon steel casings apparently have reasonable resistance.

In order to reduce rubbing speed against the packing, it is proposed to eliminate the conventional shaft sleeve. The bare shaft may be run through the packing area, but it re-

*Presented before group technical meeting, Western Petroleum Refiners Assn., Shreveport, Aug. 14, 1942, by Mr. Whiting under the title: "Trends in Centrifugal Refinery Pumps".

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quires flame hardening to produce a hard surface. An alternative is to reduce the shaft diameter and shrink on a hardened sleeve having the same outside diameter as the shaft. After shrinking on, the shaft is placed between centers and the sleeve is ground to perfect concentricity and high finish.

In some plants isomerization of normal butanes to obtain isobutane is necessary in order to maintain the feed to the alkylation plant. Most of the pump duties require only one or two-stage refinery pumps already available, but in some cases hydrochloric acid must be pumped. So far, this has been done with special reciprocating pumps. It may well be that suitable centrifugal pumps will be made available but nothing definite appears now.

Requirements for Toluene

In the manufacture of toluene, the pumps are similar to those normally encountered in fractional distillation, but are larger and more numerous due to the high capacities handled and the great number of towers required to secure close fractionation. The bottoms pumps may handle 1800 to 2000 G.P.M. against heads high enough to require 3450 r.p.m., and the pumps must be designed for hot oil service. The impeller is double suction and the pump discharge passage is of double volute design to neutralize radial thrust. The suction passages are generous in order to permit operation with low submergence.

In some toluene plants, phenol must be pumped, and this requires careful study of the stuffing box design and the materials for certain parts. Care must be taken to confine any leakage from the packing. The capacity and head conditions are within the range of single stage, overhung-impeller pumps, having only one stuffing box. A glass window enclosure over each opening to the packing gland is simple and effective. Any leakage is carried off through a pipe connected to the housing below the packing gland. This pipe is traced by a live steam line, as the phenol solidifies at 105° F.

Cast iron is excellent material for the impeller and would also serve in the casing, but here again a cracked casing is too serious a possibility. Moreover, carbon steel will not do, nor will the alloy steels ordinarily used; 4—6% chrome and 13% chrome do not have reasonable resistance, but 18/8 is fairly satisfactory. Certain very high nickel chromium steels seem to have complete resistance to attack. A typical alloy contains 19% Cr, 23% Ni., 3% Mo, and 3% Si. Iron gaskets are satisfactory, whereas the aluminum gaskets normally used have no resistance at all. Packing already developed works well, but must not contain any aluminum.

Must Handle High Heads

It was mentioned earlier that applications still existed for the type of pump originally designed to recycle hot oil in thermal cracking plants. One such application is for charge and quench pumps in thermal polymerization plants. The charge pumps must handle volumes from 500 to 1000 G.P.M. against extremely high heads, say 8000—10,000 ft. The liquid is very light, less than 0.5 sp. gr., and is pumped at atmospheric temperature. Many stages (12-16) are required to develop the head, and the long pump resulting must be built with great accuracy. The packing boxes present another problem, and mechanical sealing devices are useful here.

The quench pump service resembles the conventional hot oil recycling service, except that the temperature is lower (400-450 F.) and the suction and discharge pressures are higher. The only new metallurgical problems have to do with the materials used in internal parts having running fits in the long charge pumps, and various combinations of ferrous metals with special bronze companion parts have been successful. In some cases, parallel operation of two charge pumps is necessary and this means that a thorough study must be made of the entire pump head-capacity curve to insure stable operation at all points.

Another application for these high-pressure barrel-type pumps is for handling lean oil in high pressure absorption plants in distillate fields. Capacities range up to 1200-1300 G.P.M. and discharge pressures from 1400-2000 lbs. The oil temperature is 85°-90°F. and there are no new structural, metallurgical or packing problems, as the service is not especially severe. The remainder of the pump services in these plants are those normally encountered in conventional low pressure absorption plants.

New Uses Must be Studied

It is a little early to discuss the pumps required for continuous catalytic cracking, butadiene, styrene, hydroformer and other new plants. Generally speaking, pressures are low, although temperatures are still high, and no new or startling pump developments have been required. In about a year, this phase of pump application will repay investigation.

The addition of so many new facilities has used up available cooling water supplies in many large refineries, and new sources have been developed. Occasionally, the water has to be secured from sources remote from the plant, pumped to storage basins, conducted through channels to the refinery and there boosted up to plant pressure. New cooling towers up to 100,000 G.P.M. have been required and the necessary pumps require large amounts of power. Often electric power and steam are not available in sufficient amounts, and many gas engines have been installed to drive pumps. In fact, this has become rather common practice, although there has been a rush to install additional boilers and generators. The turbo generators used generally exhaust to high back pressure, providing steam for the various pressure levels required for power and processing needs. These boiler installations require feed pumps, for pressures ranging from 400 lbs. to 900 lbs. As a matter of interest in passing, some boiler feed pumps for industrial use in the Mid-Continent area were designed for 1600 lbs. pressure and will be installed this summer, but the plant is not a refinery.

Replacing High-Alloy Steels in War Refineries*

Substitutes to Save Chromium and Nickel Are Developed for Refinery Service

By A. Grodner**

In the petroleum industry, as in the chemical industry, the proper materials of construction are chosen to resist corrosion at the working pressures and temperatures, or to maintain a safe degree of strength at elevated temperatures, or to retain strength and ductility at sub-zero temperatures.

Our metallurgists had developed alloy steels to meet each of these requirements, so that the designers and fabricators of reaction vessels, fractionating towers, stills, evaporators, heat exchangers, could in most instances specify the most suitable material for each specific application.

But we are confronted with a very difficult and very serious problem at this time, when such elements as chromium, nickel, molybdenum, tungsten, vanadium,—the elements upon which we had depended for corrosion resistance, for strength at high temperatures, or for ductility at sub-zero temperatures—are available only in limited and in restrictive quantities.

We must, therefore, look about us for low-alloy steels, or even for the simpler carbon steels to do the job for us, even at the expense of shorter life for the equipment to be manufactured. A brief summary of such readily obtainable materials follows:

Corrosion Resistance

The austenitic stainless steel group, containing approximately 18% chromium and 8% nickel, with or without additional alloying with columbium, titanium or molybdenum, has heretofore been our first line of defense against corrosion. In many applications, however, such as for ethyl alcohol, benzene, benzol, nitric acid, vegetable and mineral oils, phenol, petroleum ether, the straight chromium steels containing 14-18% chromium (type #430) are equally satisfactory from the viewpoint of corrosion resistance and strength at high temperatures. Their use, of course, results in an important saving of nickel. Since this alloy is air-hardening, greater care in the welding and subsequent heat treatment of the completed vessel must be exercised.

As a further step towards conservation of chromium and nickel, the above mentioned 18-8 and straight chromium stainless steels are commercially available in the *clad* form, with either 10% or 20% of the total plate thickness consisting of the alloy material, and the remainder low carbon steel.

The technique developed by the several steel manufacturers of these clad materials has reached the stage of stability such that the A.S.M.E. boiler code now recognizes the *total* thickness of the composite plate in computing the required plate thickness of a pressure vessel, for all metal temperatures encountered (provided allowance is made for the strength of the steel backing material).

Commercially pure nickel and monel metal are likewise available in the clad form, with backing material either of 55,000 or 70,000 psi. minimum tensile strength. In this application, however, the A.S.M.E. code limits the pressures and temperatures within which full thickness of the composite plate may be utilized in the formulae.

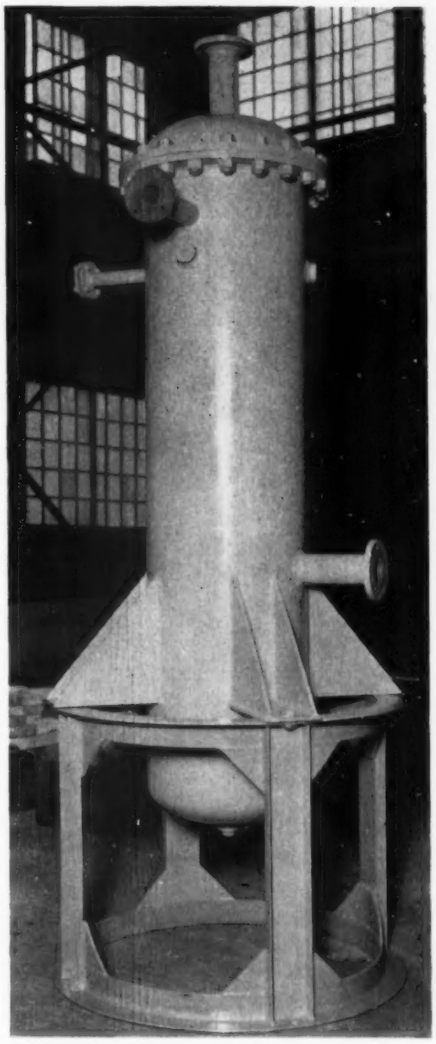
A notable example in the conservation of stainless steel may be seen in the present newly launched synthetic rubber program. The early polymerization vessels were constructed of solid 18-8 chromium-nickel stainless steel. At a later stage, the 20% clad material was employed. Now, low carbon steel vessels are *glass lined*, and the internal, intricate parts are chromium plated.

Elevated Temperatures

While the 18-8 chromium-nickel and the straight chromium stainless steels are excellent materials for retention of strength and freedom from scaling we must by-pass them now for the lower alloy steels or, even better, for carbon steels.

Between the limits of temperature of minus 20°F. and 650°F., the A.S.M.E. code and the A.P.I.-A.S.M.E. code for unfired petroleum vessels recognizes the full working strength of the low carbon flange and firebox quality steels, A.S.T.M. Spec. A-70, having a minimum tensile strength of 55,000 psi.. This is not only the least expensive material obtainable, but it is the most readily available from the steel mills, involving neither chromium nor nickel alloying.

Above 650°F., these steels decline in strength and creep value, and may lose weight from scaling. At 800°F., for example, the working stress permitted for the shell plate drops to 18% of the ultimate tensile strength (as against 25% at 650°F.), but with an additional allowance of ⅛ in. or 3/16 in. to the computed thickness, these steels can without doubt be satisfactorily employed for most of the processes in the petroleum and chemical industries.

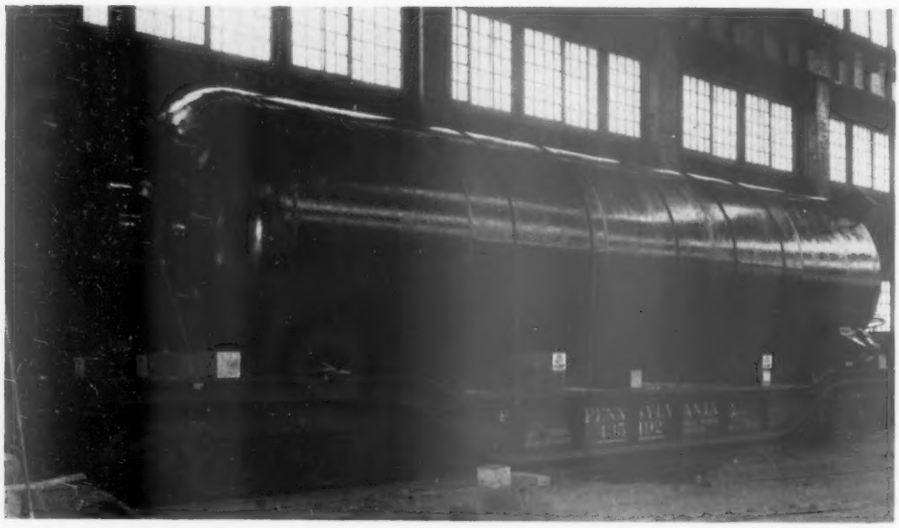


Fractionating column for distillation of volatile hydrocarbons at an eastern refinery; fabricated of 2.5% nickel steel (A.S.T.M. A-203) for service at —100°F. Column is fitted with 4 removable packed trays

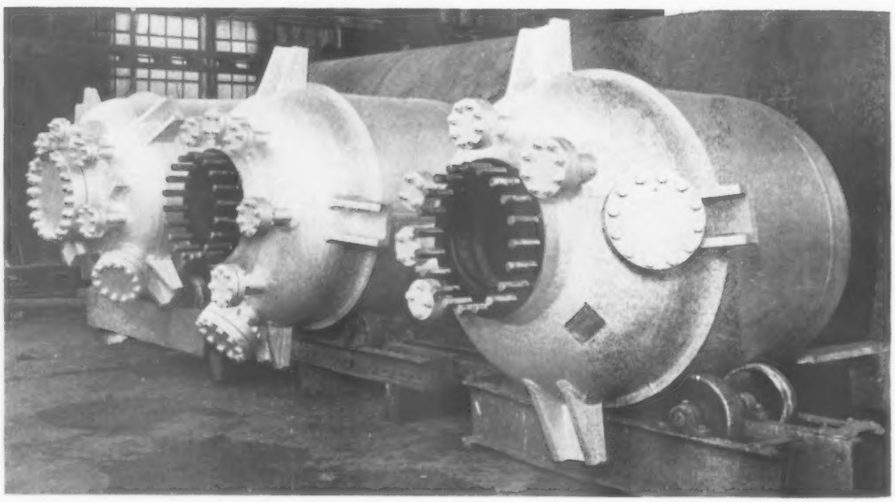
Some advantage may be derived from the use of the higher tensile strength carbon steel, A.S.T.M. A-212, Class B, having a minimum tensile strength of 70,000 psi. up to 650°F., and as can be seen from the accompanying graph, higher allowable working stresses up to metal temperatures of 850°F. This material is also readily available at the steel mills, at only a slight increase in pound price over the lower tensile strength steels mentioned in the previous paragraph.

A still greater advantage may be gained from the use of the carbon-molybdenum steel designated as A.S.T.M. A-204, containing approximately 0.5% molybdenum and having a minimum tensile strength of 75,000 psi. up to a temperature of 650°F. Because of its high creep value, this steel alloy maintains its maxi-

*Republished by arrangement with *Steel* magazine.
**Process equipment department, Blaw-Knox Co., Pittsburgh.



Chamber for removal of coke from crude petroleum, designed for maximum working pressure of 350 psi. at a metal temperature of 900°F. and subjected to a hydrostatic test of 1020 psi. at room temperature. The chamber is 10 ft. I.D. by 50 ft. long and welded of firebox quality plate, having a minimum tensile strength of 70,000 psi. of 2.5-in. thickness



Three high-pressure, direct-fired autoclaves in an eastern chemical plant. They were designed for maximum working pressure of 750 psi. at a metal temperature of 800°F., produced by direct firing the vessel with fuel oil. The autoclaves are 4 ft. I.D. by 6 ft. long inside of dished heads; are welded of 4-in. plate, of A.S.T.M. Spec. A-212; and have a minimum tensile strength of 70,000 psi. Additional thickness was added to the bottom head and the cylindrical shell for scaling which results from circulation of hot products of combustion

mum strength up to a metal temperature of 800°F., and as the graph indicates it retains fairly reasonable strength at metal temperatures up to 1000°F. This material is available not only in plate, but in seamless tubing (A.S.T.M. A-206), and in forgings (A.S.T.M. A-182).

When available, an excellent material, containing 4-6% chromium and 0.5% molybdenum is used for cracking tubes, hot oil and gas heat exchanger tubes, and hot oil or vapor lines. The addition of molybdenum to this low chromium steel combination improves the strength of the material at elevated temperatures, and avoids temper brittleness to which the chromium steels are subject when they are exposed to temperatures of over 900°F.

Sub-zero Temperatures

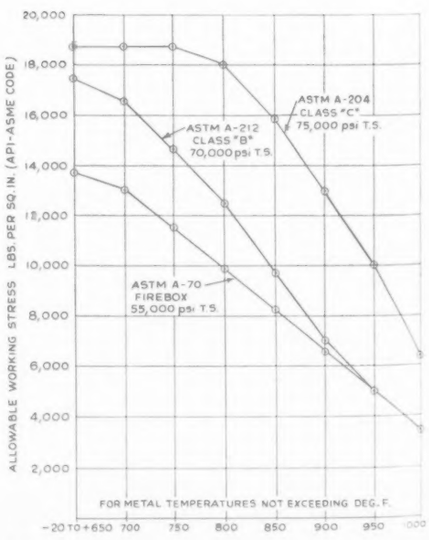
In refrigeration, in the liquefaction of gases, in the dewaxing of oils—all performed at extremely low temperatures—steels must retain not only their strength but their ductility and resistance to impact loads. For temperatures down to —50°F., the low carbon steels are satisfactory, provided they are thoroughly deoxidized and given a normalizing treatment (1500-1600°F.) to obtain grain refinement, an important factor for low temperature service.

In this way, the A.S.T.M. A-70 or A.S.T.M. A-212 steels can be prepared for welding into equipment needed in the industry, and they can be expected to give Charpy impact values of 15 ft. lbs. down to —50°F.

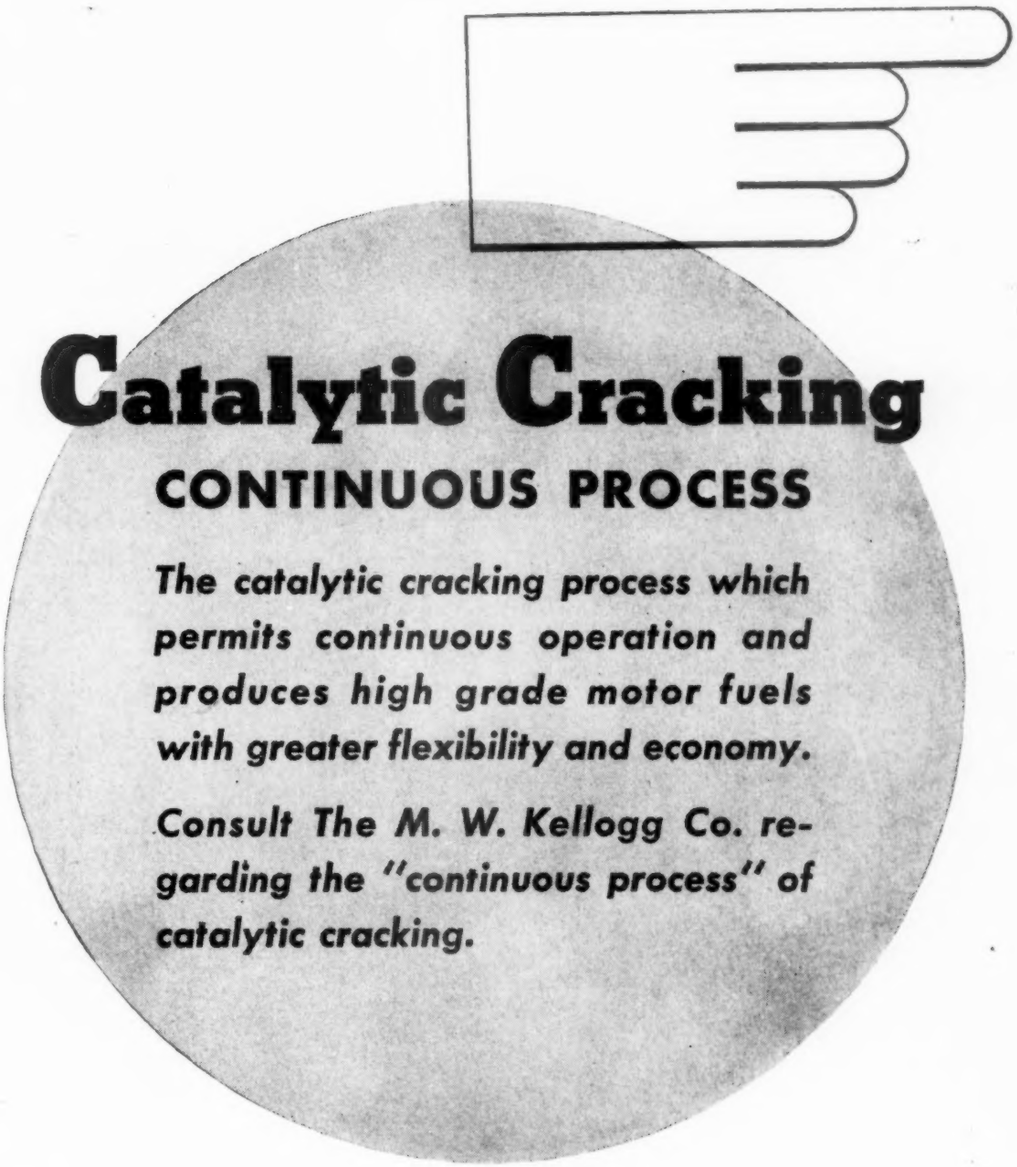
For lower temperatures, down to —100°F., a nickel-steel, containing 2-2.75% nickel (A.S.T.M. A-203), having a minimum tensile strength of 75,000 psi. at normal temperatures, has satisfactory impact values. This material can be readily welded and fabricated into the equipment required.

For still lower temperatures, down to —150°F., the 3.5% nickel-steels have been utilized with good results. This material, however, requires extreme care in its fabrication and welding. With these nickel-steels, stainless steel tubing should be used to obtain equivalent results.

In general, therefore, the low-carbon steels can be employed to replace the low-alloy steels and, in some instances, as a substitute for even the higher alloy steels. It may, of course, be necessary to use heavier sections to counteract corrosion, or scaling and lower strength at high temperatures, but it may be the only alternate for us during the present emergency.



Allowable working stresses of the higher tensile strength carbon steels



Catalytic Cracking

CONTINUOUS PROCESS

The catalytic cracking process which permits continuous operation and produces high grade motor fuels with greater flexibility and economy.

Consult The M. W. Kellogg Co. regarding the "continuous process" of catalytic cracking.

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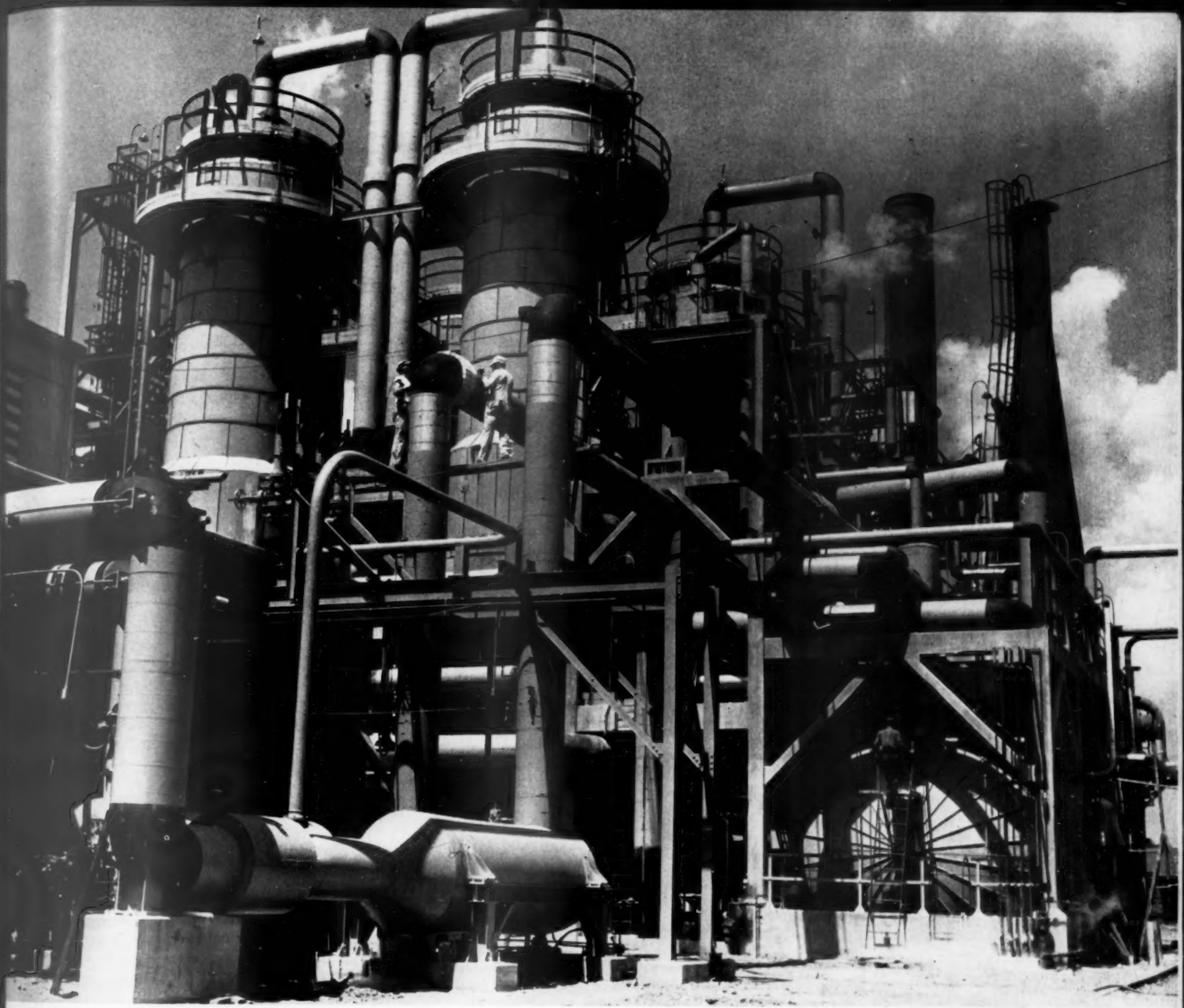
As New Cracking Units Go 'On Stream'



This view of the front of the Houdry unit shows the cases and towers, turbo compressor building lower left and turbo compressor burners in the left foreground. In lower right is the salt tank. Molten salts are used for controlling catalyst temperatures

* * *

New Houdry catalytic cracking unit is part of the wartime plant expansion program of Socony-Vacuum Oil Co., Inc. This view shows the cases where the catalytic reaction takes place, at the right, and towers, left. Compressor building is in the lower center and turbo compressor building in lower right

Acetylene and Other War Chemicals Made By Cracking in a Regenerative Furnace

ACETYLENE, a starting material widely used in the manufacture of synthetic rubber, plastics, explosives and organic chemicals essential in the nation's war program, is being produced by a new method of thermal cracking of refinery or natural gases, or petroleum distillates. Instead of using tubes, the cracking is accomplished in a regenerative furnace by bringing the vaporized charging stocks to high temperature by direct contact with a carborundum surface which has previously been heated.

The process was invented by Robert G. Wulff in the effort to find a lower cost method of making acetylene to compete with the earlier calcium carbide and electrical cracking methods. Patents are held by the Wulff Process Co. of Los Angeles. Development work since 1934 has been done by the Tennessee Eastman Corp. of Kingsport, Tenn. This resulted in a semi-works plant which has been in operation for about a year.

A commercial plant is now under construction by a chemical concern which will have a capacity of 150,000 lbs. of acetylene a day. Another commercial plant is now under construction in the East, owned jointly by an oil and a chemical company.

In commenting on the production of acetylene from petroleum, a chemical engineering authority stated that, if the manufacturing cost could be kept low enough, such as at 1 to 2c per lb., the commercial possibilities for the petroleum chemical industry would be very great.

Ethylene, another hydrocarbon used in the manufacture of ethyl alcohol and ethyl benzene, among other purposes, can also be produced by the Wulff process in amounts equal to acetylene, it is claimed.

Direct Butadiene Studied

Benzene and butadiene are among other products for which there is increased need in the war program, which can also be supplied by this process. In a preliminary study of the possibilities of making butadiene direct by this process, instead of first making acetylene and then converting into butadiene, yields of approximately 4% by weight of charging stock are said to have been secured.

Another advantage claimed for the use of a regenerative furnace, as in the Wulff process, is the conservation of high strength steels required where the cracking reaction takes place in tubes. Only carbon steel and carborundum are required for the regenerative furnaces.

The furnaces in the commercial plant now being built are 15 ft. long and 8 ft. by 8 ft. in cross-section, the cross-sectional area of the refractory being 36 sq. ft. The charging stocks are blown through ⅜ in. channels be-

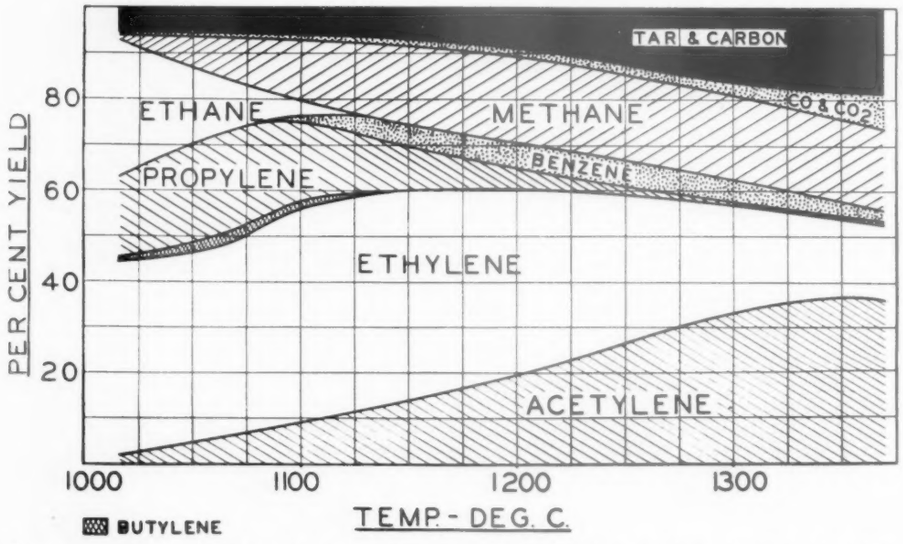


Fig. 2—Proportion of hydrocarbon constituents in gases leaving cracking furnace, charging natural gasoline in single pass

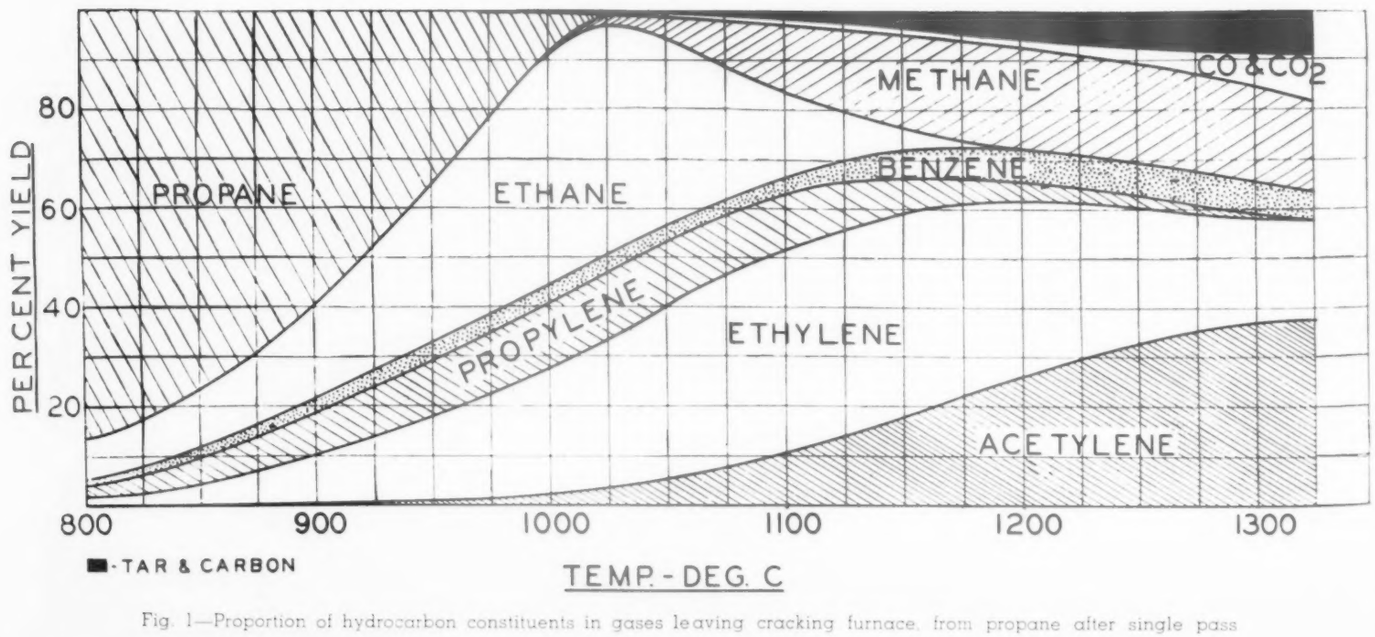


Fig. 1—Proportion of hydrocarbon constituents in gases leaving cracking furnace, from propane after single pass

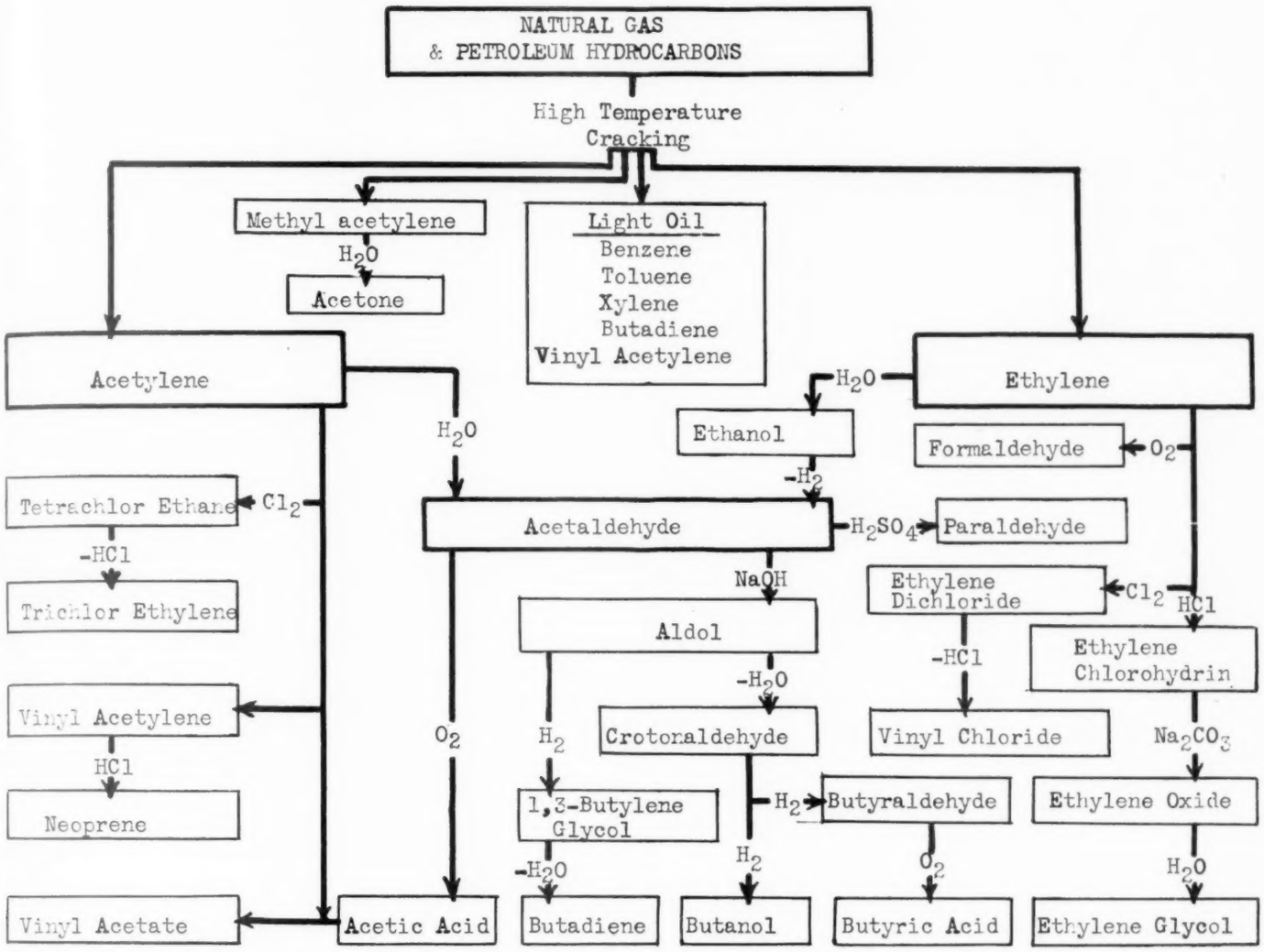


Fig. 3—Derivatives of acetylene and ethylene from high temperature cracking of natural gas and petroleum hydrocarbons

tween a checkerwork of carborundum blocks 1.25 ins. thick, at temperatures of from 1100 to 1300° C. Vapors are in the furnace only 0.1 second and the actual time of cracking is much shorter.

In practice, 3 furnaces are used, each operating on a cycle in which the refractory carborundum lining is heated by fuel gas blown through and burned in the channels between the blocks; then the fuel gas is directed to another furnace and the charging vapors are introduced into the furnace.

Recycle with Ethylene

In the early development of the Wulff process, a gas fired furnace was used, with carborundum tubes. The high flame temperature necessary to heat the charging stock in the tubes to the required temperature for cracking was found a disadvantage and the regenerative furnace was adopted. Later development of the process also led to recycling with ethylene, if the yield is for acetylene.

The accompanying description of the process and yields was supplied by the Wulff Process Co., much of the data in it being contributed by Dr. R. Leonard Hasche of the Tennessee Eastman Corp.

Description of Process

"The Wulff process is a process of producing acetylene and ethylene by high-temperature low-pressure vapor phase cracking. The cracking temperatures used are preferably from 1100° C. to 1300° C. The gases may be cracked under vacuum, but subatmospheric pressures are preferably obtained by cracking the gases under atmospheric pressure, obtaining low partial pressures on the gases being cracked by dilution with steam or other inert gas or vapor.

"The materials cracked are hydrocarbons heavier than methane, for example, ethane, butane, or propane, mixed gases containing methane and heavier components, gasoline, or other petroleum distillates. The materials used are determined almost wholly by availability and price, many different hydrocarbons being suitable raw materials.

"Both acetylene and ethylene may be produced, the relative proportions of the gases depending upon the material used and the temperature employed. Generally speaking, at temperatures below 1000° C. little acetylene is produced, and at about 1200° C. equal proportions of acetylene and ethylene are produced. If the ethylene is separated and recirculated, a condition of equilibrium cracking is established in which the yield of acetylene is approximately doubled the ethylene being converted into acetylene.

"The proportions of various carbon-containing constituents found in the mixed gases leaving the cracking furnace after a single pass, the ethylene not being recirculated and various cracking temperatures being maintained, are shown in Figs. 1 and 2.

"Fig. 1 was plotted from furnace operations cracking propane, and Fig. 2 from similar operations cracking a natural gasoline.

"The technical data found herein are verified by actual plant results of a pilot plant making 500 pounds of acetylene in 24 hours over a period of several months. In general, it may be said that when recirculating the

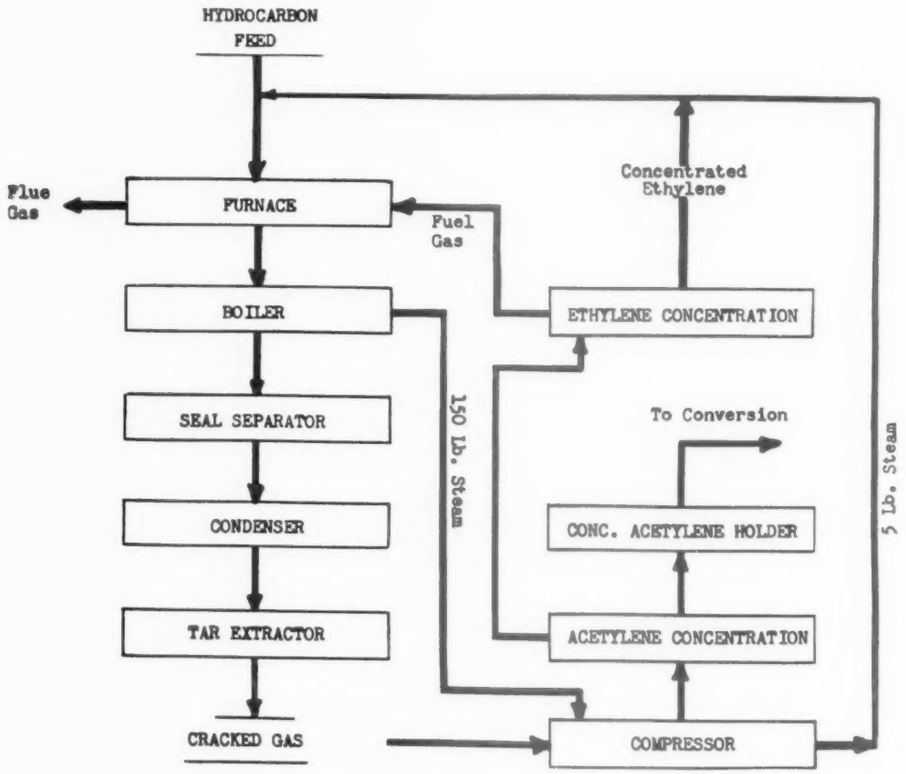


Fig. 4—General flow diagram of Wulff cracking plant

ethylene half the carbon content of the raw material is recovered in the acetylene produced, or when using a single pass and not recirculating the ethylene about half the carbon content is recovered in a mixture of acetylene and ethylene.

"Time is an essential factor in the cracking operation, acetylene being a transient product and itself being cracked to other products if the cracking time is too long. In actual operation, the gases are in the cracking furnace about 0.10 sec. and subject to actual cracking temperatures a much shorter time. The cracked gases are immediately quenched to a temperature at which acetylene is stable. Times, temperatures, and partial pressures necessary to produce optimum results have been worked out under a research program extending over several years. (Fig. 3 shows certain derivatives from acetylene and ethylene.)

Description of Plant

"A Wulff plant consists of certain apparatus for cracking hydrocarbons to produce a mixed gas containing acetylene and ethylene, and certain apparatus for separating the acetylene and ethylene from the mixed gas. A general flow sheet of such a plant is shown in Fig. 4.

"The hydrocarbon feed diluted with steam or other diluent, for example, propane, passes into the cracking furnace, which is heated by fuel gas, largely hydrogen and methane produced by the process. The mixture of hot cracked gases passes through a boiler producing steam for the process and through a seal separator, a condenser, and tar extractor, producing a mixed gas containing acetylene and ethylene at low temperature and pressure. The actual apparatus used for cracking is shown in elevation in Fig. 5. Cooled gas from the cracking apparatus is passed to an absorption plant shown in Fig. 6, being first compressed, the CO_2 being absorbed in a liquid absorbent in a first tower 7 and released from the absorbent in a first tower 8. The mixed gases freed from CO_2 pass to the second tower 7 where acetylene is absorbed, the acetylene being released from the absorbent in the second tower 8. The mixed gases are then passed to towers 9 and 10, where ethylene is absorbed and released, the mixed gases, remaining after these separations which are largely methane and hydrogen, being used as fuel in the process and containing sufficient fuel values to provide all or nearly all the heat needed in the process. The separation is comparatively simple, as the various gases to be separated have widely different boiling points and solubilities. The technology of gas separation and purification and the necessary apparatus therefor are well understood and have been worked out in detail.

"The type of furnace now used is the result of experience with several pilot and semi-works plants. In practice three furnaces are used. Each consists of a thin metal shell, since it does not have to resist substantial pressure, and a refractory lining. In the furnace is a checker-work of refractory material having narrow slots through which the gases pass and in which the cracking occurs. A considerable amount of research has been necessary to determine furnace proportions to give proper cracking and heat storage. Each furnace is operated on a 4½-minute cycle. It acts as a furnace for 3 minutes, fuel gas being blown through it and burning in the slots, during which time the refractory material forming the checker-work absorbs heat. The flow of fuel gas is then shut off and the gas to be cracked mixed with an inert diluent such as steam and blown through the slots. One furnace is cracking and two furnaces are heating at all times.

"Prior to adopting the regenerative furnace, several tube cracking furnaces were built and operated. The regenerative furnaces have proved more satisfactory than tube furnaces or stills, as the regenerative furnaces are cheaper to build and maintain and any carbon deposits formed during cracking are burned during the heating period.

Yield of Acetylene

"Exact figures are available as to the extent that fuel or raw materials of several types are converted to acetylene in actual plant operations.

"In Table 1 are shown the results obtained in cracking 28-70 grade natural gasoline at various temperatures. It will be noted that the entire temperature range of acetylene cracking is covered, up to a point where overcracking occurs. An idea of the mechanism of the pyrolysis process may be gathered by referring to Fig. 2, in which the results are plotted graphically, showing the yield of the various carbon-containing constituents obtained in the pyrolysis. Portions between the curves show the amount of the products formed at the various temperatures.

"It will be noted that even in pyrolyzing

Table 1—Pyrolysis of Natural Gasoline

Sample No.	1	2	3	4	5	6	7	8	9
Temperature—°C.	1016	1068	1106	1128	1186	1252	1306	1344	1370
Volume Increase	3.30	3.67	3.99	4.23	4.54	5.20	5.85	6.20	6.48
Carbon Balance—%	92.4	93.1	92.9	92.4	90.7	88.4	85.0	85.6	81.2
Gas Analyses—%									
Carbon Diox.	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.8	1.1
Acetylene	1.5	5.5	6.9	9.3	11.6	15.4	16.9	17.5	16.5
Ethylene	38.5	33.8	34.4	31.8	27.7	18.3	11.5	9.6	7.7
Propylene	10.6	11.5	7.7	6.0	3.2	0.9	0.3	0.2	0.1
Butylene	0.4	1.1	0.5	0.1	0.1	0.0	0.0	0.0	0.0
Benzene			0.5	0.9	0.9	1.1	0.8	0.6	0.4
Oxygen	0.2	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.6
Hydrogen	20.1	23.1	24.9	26.7	31.0	38.5	45.6	46.7	51.3
Carbon Monoxide	0.6	0.7	1.2	1.5	1.7	3.3	4.7	6.2	6.7
Methane	1.5	13.9	18.7	23.5	23.6	21.4	19.1	17.6	16.1
Ethane	26.5	10.9	4.7	0.1	0.0	0.0	0.0	0.0	0.0
Nitrogen	0.2	0.2	0.5	0.0	0.2	0.4	0.4	0.6	0.6

All three via U. O. P.

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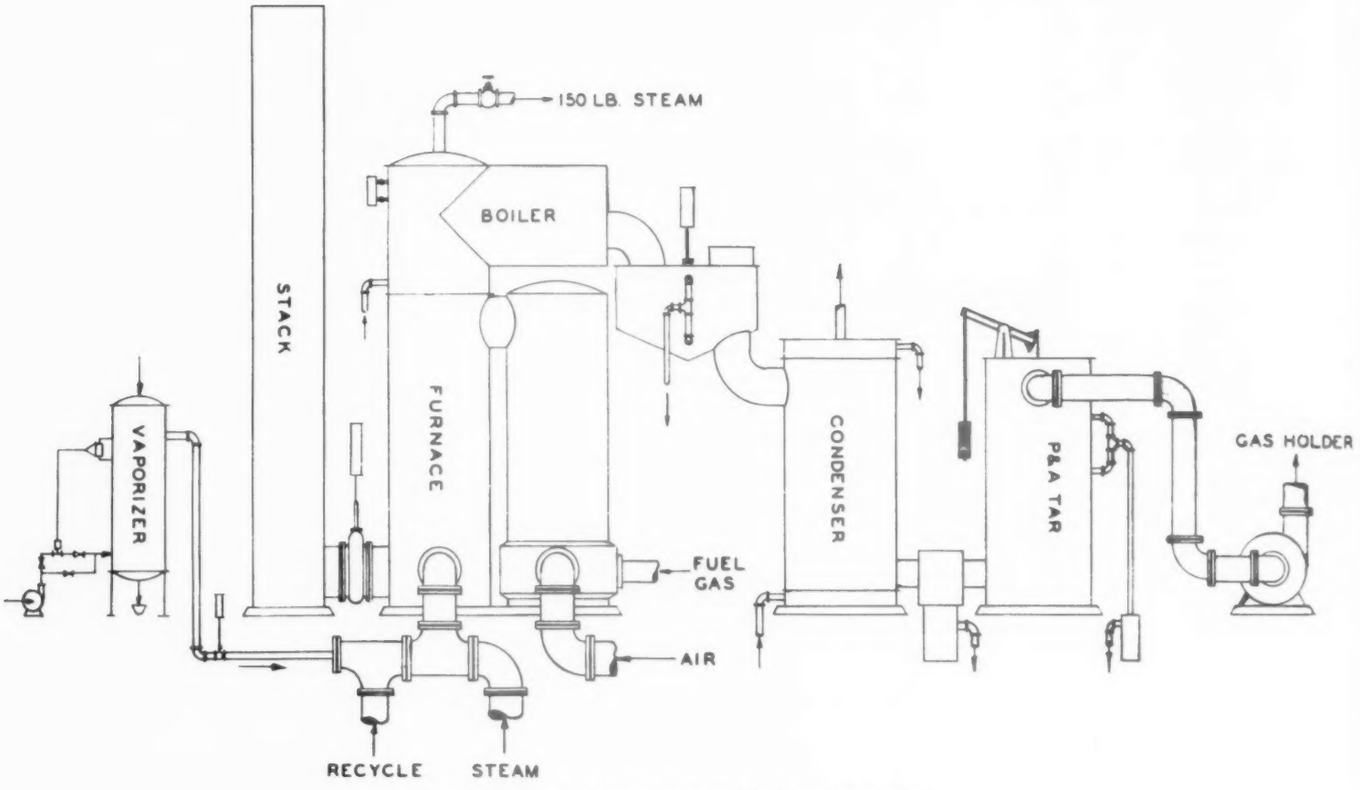


Fig. 5—Diagram of apparatus in Wulff cracking plant

natural gasoline, which is a mixture of paraffin hydrocarbons containing five or more carbon atoms, ethane is the highest member of the paraffin series present at slightly above 1000° C. It disappears above 1150° C., and the olefins are progressively converted into acetylene—butylene disappearing at about 1175° C., and propylene at a temperature of 1850° C., which is optimum for acetylene. An interesting fact is that methane increases until the ethane disappears and then remains substantially constant until 1400° C. is approached. Benzene is a very stable compound at high temperatures, due to its endothermic character, and the amount formed continues to increase up to about 1250° C.

"Table 2 shows a similar pyrolysis study on propane, in which the cracking range was extended to lower temperatures. Substantially the same contact times were used as in the case of natural gasoline, which makes possible a direct comparison of the two as to potential and commercial raw materials. Inspection of the results, shown plotted in Fig. 1 and Fig. 2, reveals great similarity between the cracking of propane and natural gasoline. The main differences noted are that propane cracks to optimum yields of acetylene and ethylene at somewhat lower temperatures than natural gasoline, and the over-all yields of desirable products from propane are greater. In fact, better yields may be expected at lower temperatures in cracking propane, since the amount of hydrocarbon feed, converted to carbon monoxide and carbon dioxide, is less,

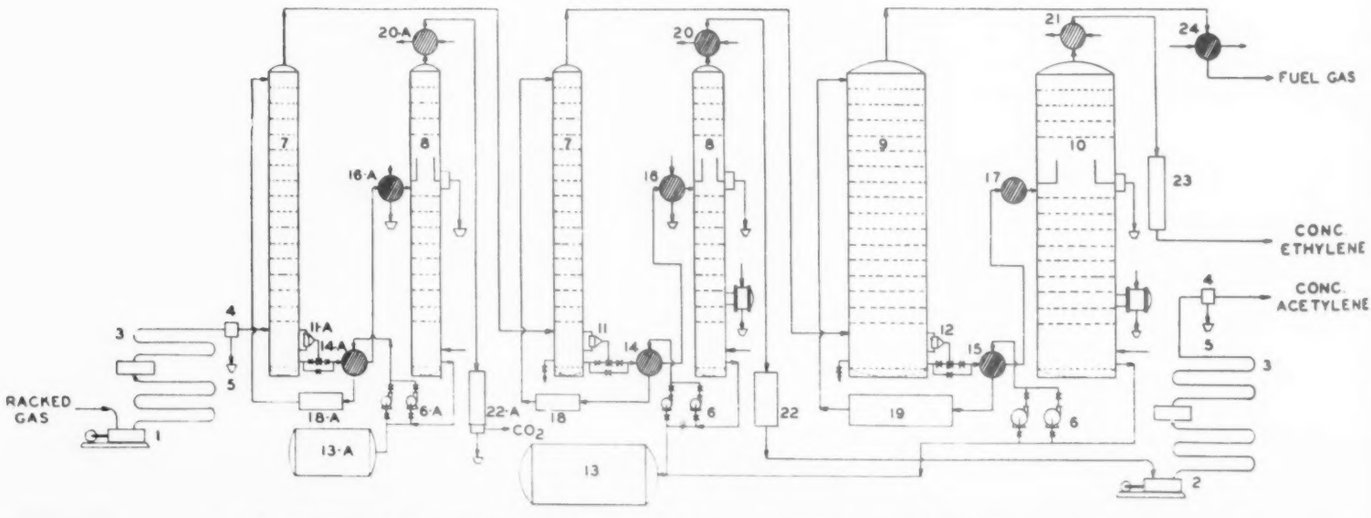


Fig. 6—Diagram of absorption plant where cooled gases from regenerative furnace are separated

Table 2—Pyrolysis of Propane

Run Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Temperature—°C.	800	850	900	950	1000	1025	1050	1075	1100	1125	1150	1190	1225	1250	1275	1300	1325
Steam Dilution	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Expansion	1.09	1.16	1.29	1.51	1.64	1.86	1.90	2.14	2.28	2.42	2.56	2.77	3.00	3.11	3.26	3.50	3.66
% Carbon Balance	100	100	100	100	99.6	99.3	98.6	98.0	97.6	96.4	96.6	96.1	94.2	92.8	92.5	93.2	91.5
% Yield—$C_2H_2+C_2H_4$	1.96	4.52	10.65	20.3	25.5	36.1	37.9	47.5	51.8	56.2	58.7	61.3	61.0	60.2	58.8	57.8	57.6
Analysis of Cracked Gas—Vol. %																	
CO_2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.4	0.4	0.6	0.6	0.7
C_2H_2	0.2	0.2	0.4	1.1	2.4	3.7	4.0	6.2	7.5	8.9	10.5	13.0	14.8	15.8	15.9	16.4	15.3
C_2H_4	2.5	5.7	12.0	19.4	20.9	25.4	25.8	27.1	26.5	26.0	24.0	20.3	15.7	13.3	11.2	8.9	8.3
C_3H_6	1.9	4.2	7.0	8.4	7.7	6.8	6.7	5.3	4.6	3.5	2.7	1.4	0.9	0.6	0.4	0.2	0.0
C_6H_6	0.8	0.9	0.8	0.9	1.0	0.9	0.7	0.9	0.8	0.8	1.0	1.2	1.1	1.0	1.1	0.9	0.7
O_2		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
H_2	4.2	6.7	11.3	16.1	18.9	23.0	23.4	27.3	30.0	32.6	35.0	39.0	43.5	45.7	47.8	49.8	51.7
CO		0.1	0.1	0.1	0.1	0.3	0.4	0.5	0.8	0.9	1.2	2.0	2.7	3.2	3.9	5.7	7.2
CH_4						3.3	6.3	15.5	17.6	20.1	21.4	21.1	20.4	19.9	18.6	17.0	15.7
C_2H_6	10.7	15.5	22.0	33.7	40.0	36.2	32.3	16.7	11.6	6.6	3.5	1.4	0.2	0.0	0.0	0.0	0.0
C_3H_8	79.8	66.5	46.1	20.1	8.8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N_2						0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.4	0.4	0.3

as is also the amount of carbon and tar formed.

"Noteworthy, as with natural gasoline, is the fact that no methane was formed below 1000° C. in cracking propane, although at this temperature 91% of the propane had disappeared. However, approximately 73% of the propane had been converted to hydrocarbons containing two carbon atoms—ethane, ethylene, and acetylene—with only about 13% and 3% of propylene and benzene, respectively, being formed. This behavior of propane during pyrolysis in the lower temperature range gives us an insight into the probable mechanism of the cracking. The predominant reaction appears to be the production of methyl, methylene, and possibly methine radicals, which then combine to form ethane, ethylene, and acetylene. At higher temperatures, above 1000° C., methane forms as a side reaction at the expense of ethane, approximately 25% of the ethane disappearing by this route. From the point where the ethane disappears, there are no further quantities of methane or the olefins formed. This would tend to show that at high temperatures no methane is formed at the expense of the unsaturated hydrocarbons. At still higher temperatures, as indicated in Table 1, the methane begins to crack.

"Inspection of Table 1, containing results on natural gasoline cracking, indicates that Sample No. 6 represents about the optimum cracking condition. Acetylene and ethylene are present to the extent of 15.4% and 18.3%, respectively. For greatest economy of raw material, both the acetylene and the ethylene should be utilized.

"In many of the cases it would be most desirable to be able to operate the process economically for acetylene alone. It was thought that this might be accomplished by some type of recirculatory cracking. In order to test the idea, the gas was separated into three fractions, namely, concentrated acetylene, concentrated ethylene, and fuel gas. By compressing the cracked gas to 300 pounds gauge pressure and using a proper choice of solvents, we were able in one stage absorption to produce a 70-80% acetylene gas, a 50-60% ethylene, and leave a fuel gas having a calorific value of about 450 B.t.u./C.F.

"Cracking with recirculation of the ethylene fraction was successful beyond our highest hopes. In addition to ethylene, an amount of methane representing about 60% of that formed in single pass cracking was also recirculated. The enhancement in acetylene yield, based on new charge stock fed, due to recirculation of concentrated ethylene, is illustrated quite simply in butane cracking. In the following table is a comparison of results in single pass and recirculatory cracking.

Table 3—Pyrolysis of Natural Gasoline with Recirculation of Ethylene

Run Number	1	2	3	4	5	6	7	Calc.
Temperature—°C.	1310	1266	1308	1290	1290	1306	1307	1300
Mol. Fraction								
—Gasoline	0.214	0.162	0.208	0.211	0.199	0.224	0.217	0.215
—Recycle	0.786	0.838	0.792	0.789	0.801	0.776	0.783	0.785
Steam Dilution	4.8	4.5	4.5	5.0	4.4	4.0	4.4	4.8
Expansion								
—Measured	2.55	2.12	2.44	2.34	2.37	2.21	2.58	
—Calculated	2.54	2.09	2.42	2.37	2.32	2.46	2.54	2.40
% Carbon Balance	92.5	91.6	89.9	90.4	90.4	87.1	89.1	91.3
% Yield C_2H_2	51.9	53.5	53.2	49.4	48.9	46.4	51.5	48.4
Analysis of Cracked Gas—Vol. %								
CO	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.5
C_2H_2	15.3	14.5	16.0	15.4	14.7	14.8	15.4	15.4
C_2H_4	15.2	18.3	14.8	17.0	17.3	16.1	14.6	18.3
C_3H_6	1.0	1.0	0.8	0.8	0.8	0.8	0.5	0.9
C_6H_6	0.6	0.8	0.9	0.8	0.8	0.6	0.6	1.1
O_2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
H_2	40.1	37.7	41.0	39.0	38.8	40.9	41.8	38.5
CO	5.3	3.0	3.8	3.3	3.5	3.4	4.5	3.3
CH_4	21.1	23.1	21.8	22.8	22.9	22.4	19.9	21.4
N_2	0.6	0.4	0.3	0.3	0.6	0.4	1.2	0.4

	Single Pass Vols. Feed Gas	Single Pass Vols. Cracked Gas	Recirculation Vols. Feed Gas	Recirculation Vols. Cracked Gas
Butane	100		26.0	
Acetylene		55.0		27.4
Ethylene		56.7	29.5	29.5
Methane		86.0	44.3	62.0
Hydrogen		162.0		76.5
Benzene		1.2		1.0
Carbon Monoxide		12.0		8.7
Carbon Dioxide		3.0		1.5
Acetylene Yield (Based on Butane Fed)		27.5%		52.3%

"It is to be noted that the yield of acetylene based on butane fed has been practically doubled by recirculating ethylene, and at the optimum operating point, represented by the above condition, there is no net gain in ethylene during the cracking. An additional advantage is that 10% less heat is required with recirculation than in single pass cracking.

"Table 1 contains results in single pass cracking of 28-70 grade natural gasoline. Table 3 is on the same material using recirculatory cracking. The calculated run in the latter table is based on Run No. 6 from Table 1. Noteworthy is the fact that there is no fundamental difference in the type of gas analysis obtained in single pass and recirculating cracking, since the calculated run is almost identical with the experimental. The acetylene yield, however, was increased from 26% to 48.4%. Thus, the duel purpose service by this development was the concentration of acetylene to a point where it was more suitable for chemical conversion, and the yield of acetylene was almost doubled.

Recycling Adopted

"The development of recirculatory cracking firmly established the economy of the process as far as raw material costs were concerned. However, an engineering study of the investment cost for a plant using tube furnaces for cracking did not present any too favorable a picture. It did not seem practical, for many reasons, to build tube furnaces with more than a limited number of tubes per unit, which would lead to high labor costs. Other

factors operating in the same directions would be frequent blowing of carbon and also tube replacements.

"Another serious disadvantage was that indirect transfer of heat through tubes for heating hydrocarbons to the neighborhood of 1300° C. required extremely high flame temperatures, which could only be attained by using preheated air for combustion. The high flame temperatures had not only a very punishing effect on the carborundum tubes, but also on the refractory material in the furnace linings. For the latter only one expensive high alumina brick could withstand the temperature without considerable shrinkage and spalling.

"The alternate method for bringing a gas to a high temperature is by its direct contact with a surface which has been previously heated; in other words, in a regenerative type of furnace. This method of cracking had not been overlooked in the early work, but no satisfactory solution was found. In some early types of furnaces broken carborundum packing was alternately fired with combustion gas and in turn gave up its heat to the hydrocarbon cracked. However, the acetylene yields did not compare with those obtained in tube-cracking. Also, trouble was encountered with a building up of carbon which was not removed during the heating cycle. In time the carbon became graphitic in nature and could not be burned out even with oxygen.

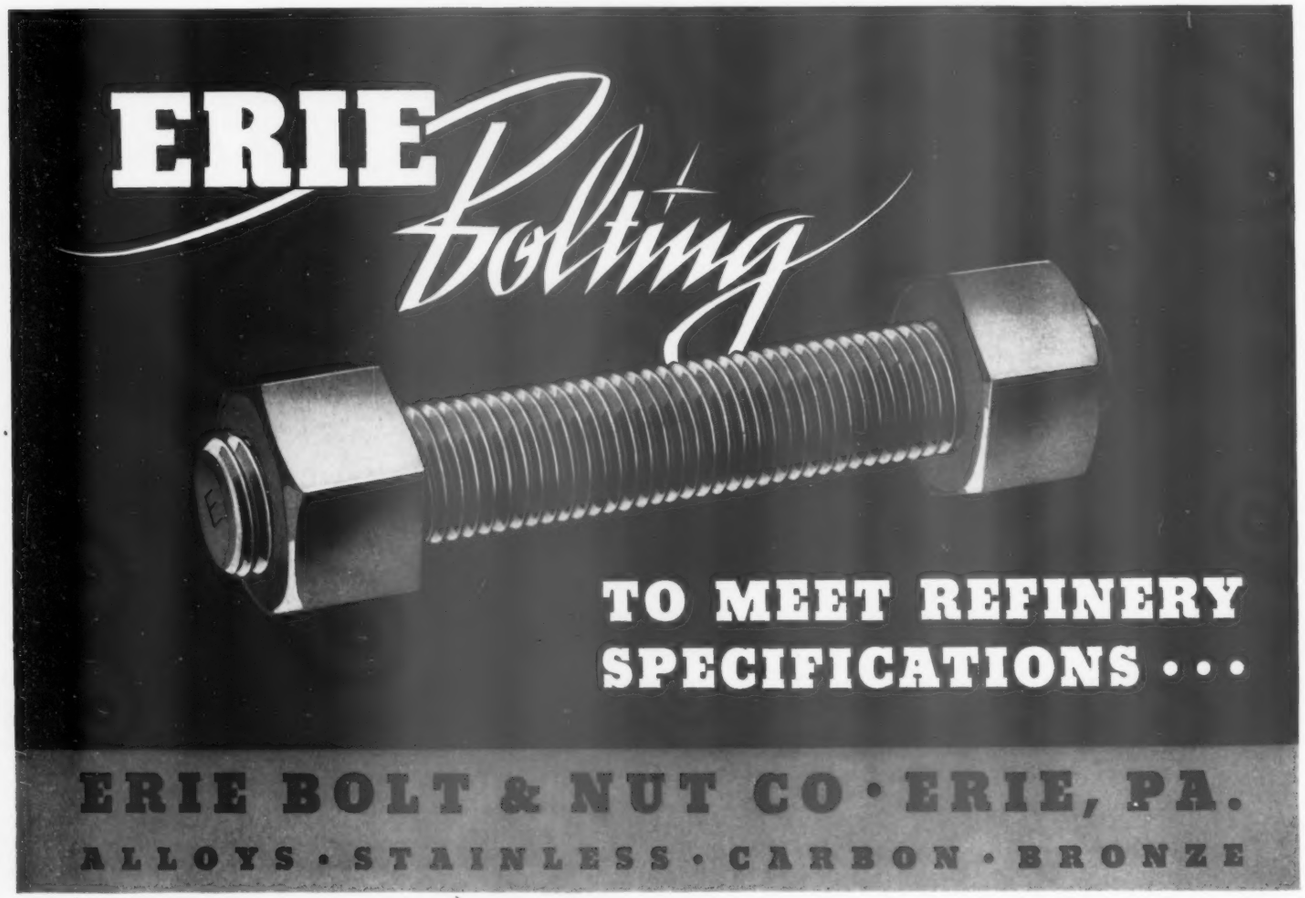
"As a result of extensive work on tube-cracking, a large amount of experience was gained on contact times, rates of heat transfer with carborundum, and heat absorption by the refractory by convection and radiation, so that a satisfactory solution could be worked out on the use of the regenerative furnace. Accordingly, a semi-works furnace was constructed with carborundum brickwork laid so as to present vertical, uninterrupted slots of very narrow width. The slots were bounded by carborundum of sufficient thickness to furnish the necessary heat storing capacity and yet thin enough to prevent spalling from heat shock. The dimensions of surface, volume of passage, and refractory for a given gas-steam flow were very critical to give optimum cracking results.

"The complete cycle is quite definitely set 1½ minutes cracking and 3 minute heating times. The results obtained when cracking butane are shown in the following table:

	After 15 Seconds	After 90 Seconds	Average Entire Cycle
Carbon Dioxide	1.6	0.8	1.1
Acetylene	14.1	11.2	12.3
Ethylene	16.5	23.0	17.6
Benzene	0.5	0.6	0.6
Oxygen	0.2	0.2	0.3
Hydrogen	39.4	33.2	38.0
Carbon Monoxide	3.3	1.2	1.7
Methane	22.2	27.4	26.4
Ethane		1.0	0.6
Nitrogen	1.5	1.4	1.4

"A boiler was provided for generating sufficient steam to furnish the power for compressing the cracked gases for the absorption unit, the boiler heat being absorbed from the cracked gases. With steam-driven compressors operating on a 5-lb. exhaust, the requisite amount of steam was available for diluent in the cracking operation. For a continuous supply of cracked gas and steady operation of auxiliary blowers and exhausters, three furnaces are used. Automatic time cycle controllers to actuate the valves for process, gas, steam, fuel, and combustion air are of the same type as in water gas practice. When combined with the automatic flow controls of the various feeds, the operation of the units becomes almost entirely automatic, and labor costs are small.

"The sizes of the regenerative furnaces for acetylene cracking is surprisingly small, since they operate at a tremendously high rate of heat absorption and withdrawal. They possess an added advantage in that there is no build-up of carbon, it being completely burned out during each heating portion of the cycle. The carborundum in the high temperature zone is subjected to a much lower temperature than in the case of tube-cracking, which leads to greater refractory life."



Crude Naphtha Stabilizer Performance*

By J. Q. McGiffin**

Information helpful to refiners in their wartime program of producing 100-octane number aviation gasoline is contained in the accompanying article, which is based on experimental data obtained from 6 different engineering performance tests run on an actual 42-in. I.D. by 61-ft. commercial naphtha stabilizer installation. Two definite ideas are set forth as related to the problem of separation of isopentane cuts from straight-run naphtha for blending with base alkylate to produce aviation gasoline:

1—The degree of fractionation obtainable in a 30-plate column to effect an isopentane separation is clearly defined.

2—Tower capacity limitations, both downcomer and free vapor space, are outlined.

The tower was operated just below flooding conditions during the test periods to make as close a cut as possible between iso and normal pentane, and normal butane and isopentane, from a feedstock consisting of raw, straight-run crude naphtha.

Introduction

THE information and data contained in this paper is being released and published in the hope that it will stimulate discussion and interest in the subject of critical vapor and downcomer velocities in commercial bell-cap plate fractionating towers. Very little information is available in the literature at present on this subject and full-scale plant data on such equipment is ordinarily withheld.

Numerous ideas have been advanced in the literature, however, pertaining to critical velocity conditions and entrainment in laboratory and semi-plant scale columns, with some correlations between these data and column design and commercial towers performance. This literature includes articles by the following: Souders and Brown,[1] Rogers and Thiele,[2] Holbrook and Baker,[3] Ashraf et al,[4] Rhodes,[5] Sherwood and Jenny,[6] Pyott et al,[7] and Harbert et al.[8]

This paper reports plant data and calculated results on 6 full-scale engineering tests recently conducted on a complete crude naphtha stabilizer system. The calculated results for each test include the following:

I—Internal Reflux at Top of Tower

II—Limiting Vapor Velocity in Free Area at Top of Tower

III—Actual Vapor Velocity at Top of Tower (Free Area and Slots)

IV—Downcomer Velocity at Top of Tower

V—Vaporization in Reboiler

VI—Limiting Vapor Velocity in Free Area at Bottom of Tower

VII—Actual Vapor Velocity at Bottom of Tower (Free Area and Slots)

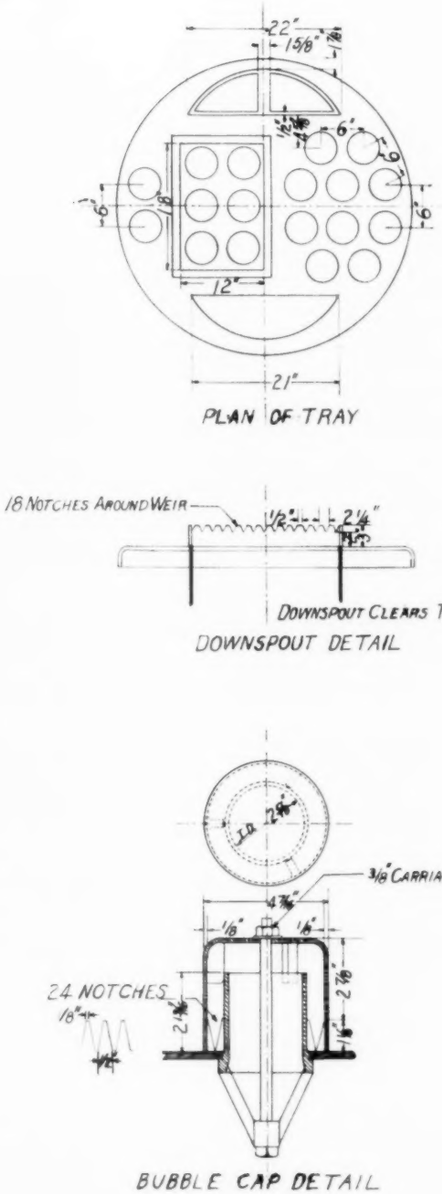
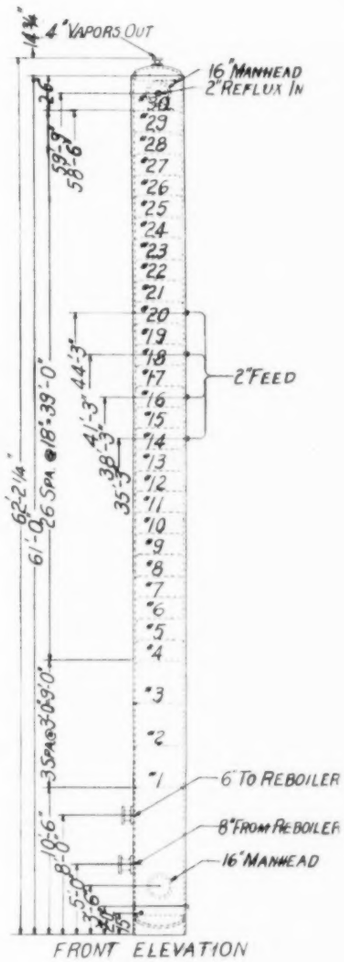


Fig 1—Crude naphtha stabilizer details



*Presented before American Institute of Chemical Engineers, Boston, May 11-13, 1942. Published in the Institute's transactions, Vol. 38, No. 4.

**The Standard Oil Co. of Ohio (Latonia Refining Corp., Latonia, Ky.).

VIII—Downcomer Velocity at Bottom of Tower

IX—Tower Performance—Per Cent Separation Obtained

X—Heat Exchanger Performance

Illustrative calculations for Test VI have been included for the first 8 points above under "Method of Calculation of Results."

Description of Crude Naphtha Stabilizer

The stabilizer tested had an inside diameter of 42 in. and an overall height of 61 ft., with a total of 30 trays. Tray spacing was 18 in. for 27 trays, with a 3-ft. spacing for the bottom 3 trays. Tower, tray, and cap details are shown in Fig. 1. Each tray contained 18 bell caps, 4 ⅞ in. O.D. An added feature of the tower was a 12 in. x 18 in. rectangular bolted section in every plate which provided a system of interior manways up through the tower, starting from the bottom. Downcomers were of the half-moon type, with notched circular weirs, with the bottom of each downcomer having a 1-in. clearance from the top of the tray below. The following pertinent areas were used for velocity calculations:

1—Free tower area for vapor velocity (Note that this is the difference between the total free area of the tower equal to 9.61 sq. ft. and the total area of one downcomer equal to 0.61 sq. ft.)—9.0 sq. ft.

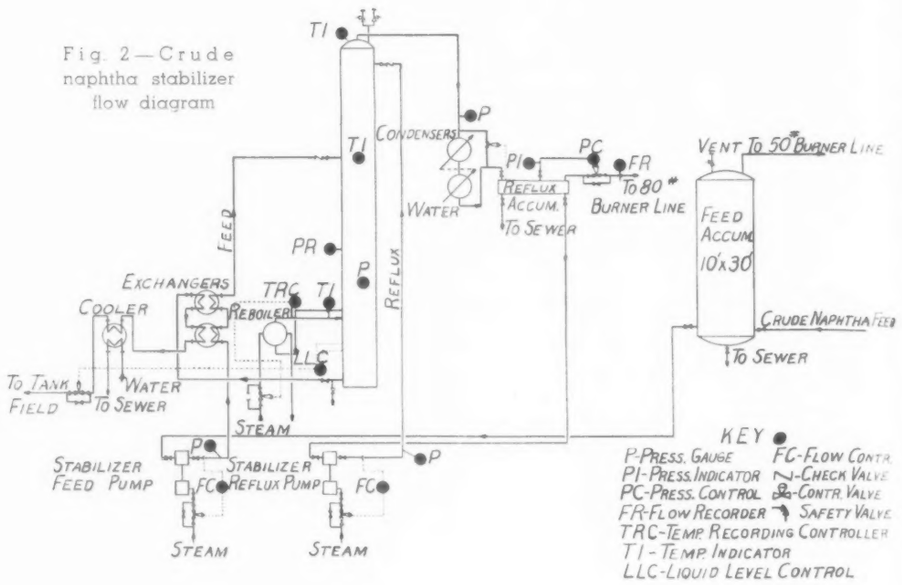


Fig. 2—Crude naphtha stabilizer flow diagram

2—Total slot area per tray—1.055 sq. ft.

3—Limiting area at top of downcomer—0.444 sq. ft.

4—Limiting area under downcomer—0.357 sq. ft.

The feed to the tower, shown in a flow diagram in Fig. 2, was pumped by a simplex reciprocating steam pump taking suction on a 10 by 30 ft. feed drum. It flowed counter-current through the tube side of two bottoms-feed tube and shell type heat exchangers and from thence into the tower on tray No. 16 (from the bottom). The stabilized bottoms after leaving the feed exchangers flowed through a cooler, with water in the tube side, and from there to the tank field. Reboiler heat was supplied by steam, average pressure equal to 135 p.s.i., in the tubes of the reboiler exchanger. Totally condensed overhead after leaving the two overhead condensers, with cooling water in the tubes, was delivered to the reflux accumulator, and reflux returned to the tower by means of a simplex reciprocating steam pump. Excess overhead liquid production was delivered to another plant nearby. The tower was equipped for operation with a back pressure control valve on the uncondensed gas line leaving the system. However, the tower was operated during the first 4 tests with this line shut off, and the pressure was then maintained by controlling the temperature of the totally condensed overhead by adjusting the water rate. The last two tests were also run with totally condensed overheads. A new pressure control valve system, which maintained a steady pressure on the reflux drum by bypassing hot vapors around the condensers into the reflux drum as the pressure dropped, was successfully used during these last two tests. Fig. 3 gives an isometric layout of the entire crude naphtha stabilizer system, and Fig. 4 is an actual photograph of the column, taken from the top of a nearby tower.

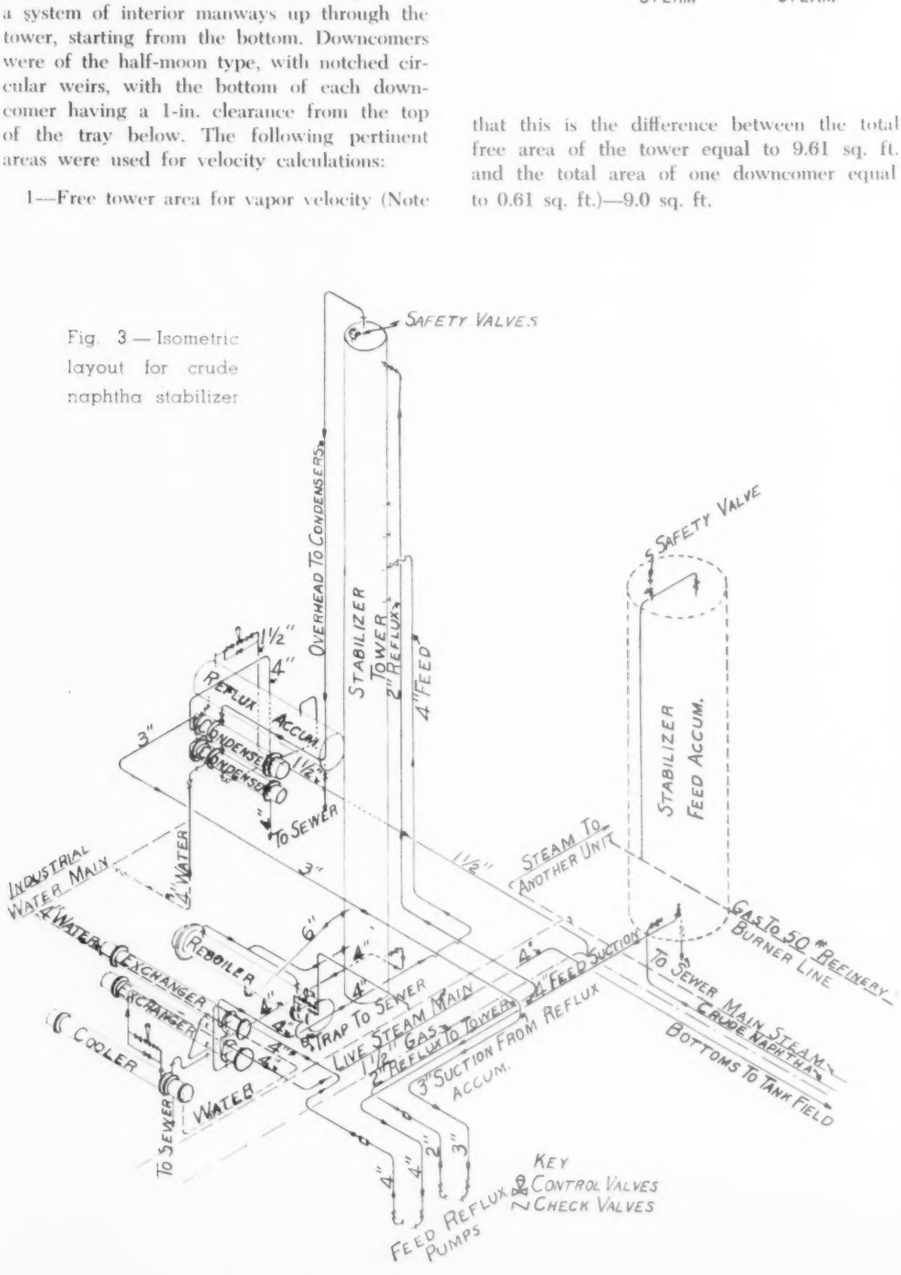


Fig. 3—Isometric layout for crude naphtha stabilizer

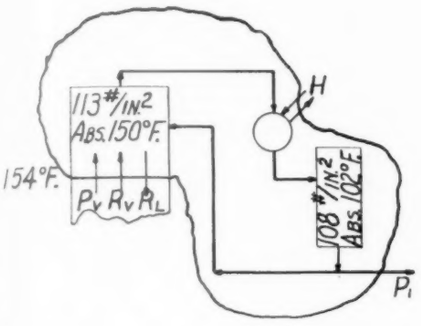


Fig. 5—Heat balance envelope around top tray

Test Procedure

Six separate tests were run on the system. The first 4 were run during winter and the last two under summer conditions. Tests I, II, V, and VI were performed attempting to cut between isopentane and normal pentane overhead, while during Tests III and IV an attempt was made to cut between normal butane and isopentane. The tower was operated during all 6 tests in such a manner as to produce nearly flooding conditions. In each case the tower was actually flooded, evidenced by tower center and top temperature rising and approaching each other, by the reflux drum level rapidly rising, and by the overall pressure drop between reflux drum and tower bottom becoming excessive. The tower was then backed down (reflux rate lowered or reboiler temperature reduced) slightly from these conditions for each test and allowed to reach equilibrium over a period of several hours, at the end of which time complete test data and samples were taken. The extent of this "backing down" effect naturally varied from test to test, but for all cases the operating conditions can be considered as next door to flooding.

Test data were taken from existing tower equipment, shown in Fig. 2. Additional test information was obtained by means of indicating pressure gauges, and temperatures around the exchanger equipment were secured from calibrated mercury in glass thermometers. Stabilized bottoms production was obtained from tank gauges and liquid overhead production was calculated by difference between feed rate measured with a recording flow control meter and bottoms production.

Samples of stabilized bottoms, and liquid overhead production were taken into special pressure sample bombs for Podbielniak analysis and complete laboratory inspections. A Podbielniak heligrid-packed column of the automatic type was used. Laboratory inspection data are reported on a feed sample covering the first 4 tests, and on individual feed samples for the last two tests.

Method of Calculation of Results

In order to facilitate interpretation of the data, the following sample calculation of Test VI is offered. A similar procedure was followed in the calculation of the first 5 tests. Although no examples of exchanger heat transfer coefficient calculations are shown, the standard method of calculation was followed throughout.

Rates

Feed ..... 30,200 lbs./hr. 5.665 lbs./gal. 76.4°A.P.I.
Bottoms ..... 26,050 lbs./hr. 5.837 lbs./gal. 70.3°A.P.I.
Overhead
Production 4,150 lbs./hr. 4.74 lbs./gal. 117.2°A.P.I.
Reflux ..... 8,460 lbs./hr. 4.74 lbs./gal. 117.2°A.P.I.

Properties*

Feed ..... 168° F. Mid-boiling point. Characterization factor = 12.6. Specific heat correction factor = 1.045.

Bottoms ..... 171° F. Mid-boiling point. Characterization factor = 12.2. Specific heat correction factor = 1.022. Molecular weight = 89. Latent heat at atmospheric pressure = 144 B.t.u./lb. Latent heat at 104.5 lb./sq. in. absolute pressure = 109 B.t.u./lb.

Overhead Production and Reflux ..... 10° F. Mid-boiling point. Molecular weight = 58. Average composition = isobutane.

I. Calculation of Internal Reflux at Top of Tower

Heat Out in Overhead Condensers. (Total heats from Sage and Lacey.[12])

(In) Total heat of IC_4H_{10} above 60° F. at 147° F. and 110 lb./sq. in. absolute ..... = 175.5 B.t.u./lb.

(Out) Total heat of IC_4H_{10} above 60° F. at 102° F. and 110 lb./sq. in. absolute ..... = 24.0 B.t.u./lb.

Difference = 151.5 B.t.u./lb.

*Characterization factor data, specific heats of liquids, specific heat correction factor, mid-boiling point, molecular weight, latent heat at atmospheric pressure—Watson and Nelson,[9] and Watson, Nelson and Murphy.[10] Latent heat change with pressure—Watson.[11]

(Overhead product) + (external reflux) = (total overhead product) 4,150 lb./hr. + 8,460 lb./hr. = 12,610 lb./hr.

12,610 (151.5) = 1,912,000 B.t.u./hr.

Referring to Fig. 5, a heat balance envelope was drawn around the top plate and overhead condensing system, with nomenclature as follows:

P_V = Heat entering in overhead production vapors above 60° F. at 154° F. and 113 lb./sq. in. absolute in B.t.u./hr.

P_L = Heat leaving in overhead production liquid above 60° F. at 102° F. and 108 lb./sq. in. absolute in B.t.u./hr.

R_V = Heat entering in internal reflux vapors above 60° F. at 154° F. and 113 lb./sq. in. absolute in B.t.u./hr.

TABLE I.—SUMMARY OF CALCULATED RESULTS (I-VIII)

	Test I	Test II	Test III	Test IV	Test V	Test VI
I. Internal reflux at top of tower						
Lb./hr.	41,700	28,350	19,650	13,160	7,710	10,580
Internal weight reflux to overhead product ratio at top of tower	6.96	5.75	3.71	3.53	2.32	2.55
II. Limiting vapor velocity at top of tower						
Free area, ft./sec.	0.84	0.93	0.87	0.91	0.82	0.87
III. Actual vapor velocity at top of tower						
Free area, ft./sec.	0.96	0.85	0.55	0.42	0.21	0.33
Slots, ft./sec.	8.17	7.23	4.69	3.55	1.77	2.78
IV. Downcomer velocity at top of tower						
Top of downcomer, ft./sec.	0.82	0.56	0.39	0.26	0.16	0.21
Under downcomer, ft./sec.	1.02	0.70	0.48	0.32	0.20	0.27
V. Vaporization in reboiler						
Lb./hr.	58,600	42,700	32,800	23,100	27,350	25,750
Reboiler weight vaporization to bottoms product ratio	3.92	2.81	1.53	1.36	0.69	0.99
VI. Limiting vapor velocity at bottom of tower						
Free area, ft./sec.	0.79	0.83	0.83	0.88	0.78	0.83
VII. Actual vapor velocity at bottom of tower						
Free area, ft./sec.	1.05	0.81	0.62	0.53	0.42	0.47
Slots, ft./sec.	8.99	6.90	5.26	4.52	3.60	4.01
VIII. Downcomer velocity at bottom of tower						
Top of downcomer, ft./sec.	1.34	1.05	0.99	0.73	1.17	0.90
Under downcomer, ft./sec.	1.67	1.30	1.23	0.91	1.46	1.12

TABLE II.—SUMMARY OF TOWER PERFORMANCE—PER CENT SEPARATION OBTAINED
(Calculated Result IX)

	Test I	Test II	Test III	Test IV	Test V	Test VI
Purpose of test—Cutting between	IC_4H_{12} & C_5H_{12}	IC_4H_{12} & C_5H_{12}	C_4H_{10} & IC_5H_{12}	C_4H_{10} & IC_5H_{12}	IC_4H_{12} & C_5H_{12}	IC_4H_{12} & C_5H_{12}
Feed rate, lb./hr.	20,940	20,135	26,640	20,720	43,095	30,200
Overhead production rate, lb./hr.	5,990	4,935	5,290	3,720	3,345	4,150
Bottoms production rate, lb./hr.	14,950	15,200	21,350	17,000	39,750	26,050
External reflux rate, lb./hr.	34,300	24,000	16,800	12,380	5,860	8,460
% Butanes in feed removed overhead	100	100	100	90.8	67.2	95.8
% Total pentanes in feed removed overhead	44.4	33.4	6.6	1.0	14.8	13.9
% Iso-pentanes in feed removed overhead	76.8	65.0	Not separated		15.1	22.4
% Normal pentanes in feed removed overhead	27.7	17.8	Not separated		14.6	13.9
% Hexanes in feed removed overhead	0	0	0	0	0.1	0.03

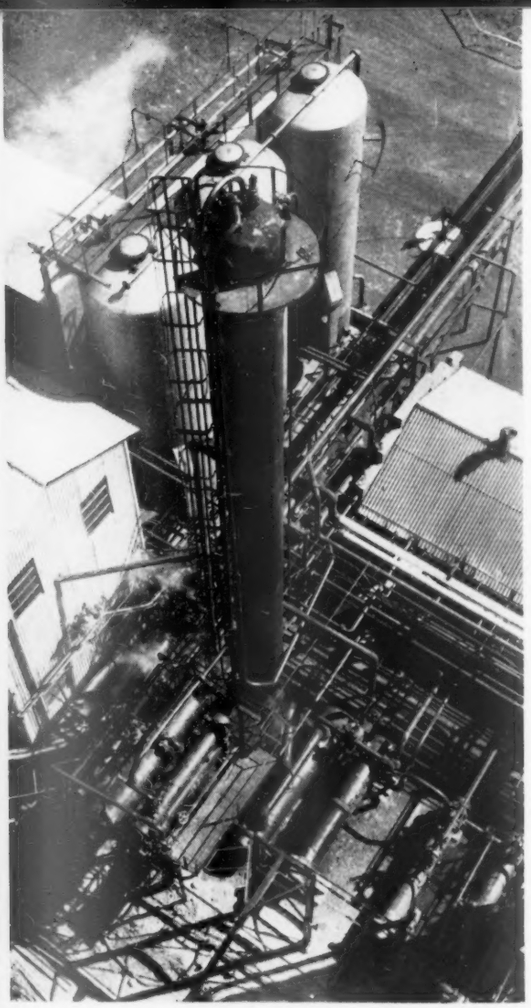


Fig. 4—Crude naphtha stabilizer system

R_L = Heat leaving in internal reflux liquid above 60° F. at 154° F. and 113 lb./sq. in. absolute in B.t.u./hr.

H = Total heat leaving in overhead condensers above 60° F. at 110 lb./sq. in. absolute in B.t.u./hr.

R = Internal reflux in lb./hr.

h_R = Latent heat of R at 154° F. and 113 lb./sq. in. absolute in B.t.u./lb.

Then, equating:

$$(1)\ P_V + R_V = R_L + H + P_L$$

$$(2)\ R_V - R_L = H + P_L - P_V$$

$$(3)\ R = \frac{R_V - R_L}{h_R}$$

The quality of overhead product vapor and liquid, and internal reflux was considered to be isobutane. The heat data used below was obtained from Sage and Lacey.[12]

P_V = 4,150 (lb./hr.) × 177.5 (total heat in B.t.u. lb.) = 737,500 B.t.u./hr.

P_L = 4,150 (lb./hr.) × 24 (total heat in B.t.u./lb.) = 99,600 B.t.u./hr.

H = 1,912,000 B.t.u./hr.

h_R = 120.5 B.t.u./lb.

Solving Equations (1), (2) and (3):

R = 10,580 lb./hr.

Internal weight reflux to overhead product ratio at top of tower = $\frac{10,580}{4,150}$ = 2.55/1.

TABLE III.—HEAT EXCHANGER PERFORMANCE (Calculated Result X) OVERHEAD CONDENSERS (Two in Series)

Service:	Test I	Test II	Test III	Test IV	Test V	Test VI
Shell side	Condensing Overhead Vapors					
Tube side	Water					
Effective external area, sq.ft.	926					
Log mean temp. difference (uncorrected)	54	50.5	52.7	42.0	30.5	37.5
Heat transferred, B.t.u./hr. × 10^3	6,260	4,560	3,275	2,300	1,480	1,912
Approach Temp. (Hot end) °F.	31.5	38	35	28	36	44.5
Approach Temp. (Cold end) °F.	86	66	76	61	25.5	30.3
U—B.t.u./(hr.)(sq.ft.)(°F.)*	125.0	97.6	67.1	59.1	52.4	59.1
Shell Side:						
Temp. in, °F.	173	150	147	129	161	147
Temp. out, °F.	133	115	119	104	96	102
Lb./hr. vapor in	40,290	28,935	22,090	16,100	9,205	12,610
Lb./hr. condensate	40,290	28,935	22,090	16,100	9,205	12,610
°A.P.I., vapor in	108	111	114	118	115	117
°A.P.I., condensate	108	111	114	118	115	117
Tube Side:						
Temp. in, °F.	47	49	43	43	70.5	70.7
Temp. out, °F.	141.5	112	112	101	125	102.5
Gal./min. (calculated)	133	145	95	79	54	120
Lb./hr. (calculated)	66,300	72,400	47,500	39,700	26,800	60,100

Tube Data:	No.	O.D."	Ga.	Lgth."	Material	Ext. Surface sq. ft.
Upper Condenser	208	5/8	18	120	(Antimonial)	480
Lower Condenser	278	5/8	18	120	(Admiralty)	446

* NOTE: Good design transfer rate for this type unit when clean is U = 85 B.t.u./(hr.)(sq.ft.)(°F.).

TABLE IV.—HEAT EXCHANGER PERFORMANCE (Calculated Result X) REBOILER

Service:	Test I	Test II	Test III	Test IV	Test V	Test VI
Shell side	Bottoms Liquid and Vapors					
Tube side	Steam					
Effective external area, sq.ft.	750					
Log mean temp. difference (uncorrected)	50.5	57	69	88.7	41	62.7
Heat transferred, B.t.u./hr. × 10^3	6,936	5,129	4,033	2,884	3,274	2,927
Approach temp. (hot end) °F.	43	51	62	82.5	36	59
Approach temp. (cold end) °F.	59	64	76	95	47	66
U—B.t.u./(hr.)(sq.ft.)(°F.)*	183	120.2	78	43.5	106.5	62.3
Shell Side:						
Temp. in, °F.	300	295	283	264	310	290
Temp. out, °F.	316	308	297	277	321	297
Lb./hr. liquid in	73,550	57,900	54,150	40,100	67,100	51,800
Lb./hr. vaporized	58,600	42,700	32,800	23,100	27,350	25,750
°A.P.I., liquid out	72.1	71	73.1	74.4	66.9	70.3
Mid-boiling point, °F., liquid out	162	164	158	154	194	171
°A.P.I., vapor out (assumed)	75	74	76	77	70	73
Tube Side:						
Temp. in, °F.	359	359	359	359	357	356
Temp. out, °F.	359	359	359	359	357	356
Lb./hr. (calculated)	8,030	5,930	4,660	3,340	3,790	3,390

Tube Data:	No.	O.D."	Ga.	Lgth."	Material
	222	1	13	155	Steel

* NOTE: Good design transfer rate for this type unit when clean is U = 70 B.t.u./(hr.)(sq ft.)(°F.)

TABLE V.—HEAT EXCHANGER PERFORMANCE (Calculated Result X) BOTTOMS-FEED EXCHANGER No. 1

Service:	Test I	Test II	Test III	Test IV	Test V	Test VI
Shell side	Stabilized Liquid Bottoms					
Tube side	Raw Feed Liquid & Vapors					
Effective external area, sq.ft.	567					
Log mean temp. difference (uncorrected)	59.5	59.0	53.5	46.0	66.5	61.0
Heat transferred, B.t.u./hr. × 10^3	1,178	1,203	1,295	920	2,045	1,543
Approach Temp. (hot end) °F.	75	79	58	49	68	69
Approach temp. (cold end) °F.	46	43	49	43	65	53
U—B.t.u./(hr.)(sq.ft.)(°F.)*	34.9	36.0	42.7	35.3	54.2	44.6
Shell Side:						
Temp. in, °F.	308	302	287	266	315	293
Temp. out, °F.	183	175	191	179	234	207
Lb./hr. liquid in	14,950	15,200	21,350	17,000	39,750	26,050
°A.P.I., liquid in	72.1	71.0	73.1	74.4	66.9	70.3
Mid-boiling point, °F., liquid in	162	164	158	154	194	171
Tube Side:						
Temp. in, °F.	137	132	142	136	169	154
Temp. out, °F.	223	223	229	217	247	224
Lb./hr. liquid in	20,940	20,135	26,640	20,720	43,095	30,200
°A.P.I., liquid in	82.2	81.1	81.1	81.8	70.7	76.4
Mid-boiling point, °F., liquid in	141	141	141	141	193	168

Tube Data:	No.	O.D."	Ga.	Lgth."	Material
	270	5/8	18	155	Admiralty

* NOTE: Good design transfer rate for this type unit when clean is U = 60 B.t.u./(hr.)(sq.ft.)(°F.).

EQUIPMENT MADE FOR SERVICE

This is a Water Shipment too large for Rail.

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II. Calculation of Limiting Vapor Velocity in Free Area at Top of Tower

This velocity was determined using the following formula:

$$V_c = 4.04 \sqrt{\frac{TS}{MP}}$$

Where:

V_c = Critical vapor velocity in ft./sec. based on entrainment droplet = 0.004 in.
T = Vapor temperature in °R
S = Liquid specific gravity at temperature, T
M = Vapor molecular weight
P = Operating pressure, in lb./sq. in. absolute
4.04 = Factor for maximum velocity with high fractionating efficiency for 18-in. tray spacing

This formula is similar to that reported by Packie,[13] except that he used P in terms of inches of Hg absolute, giving a slightly higher factor, i.e., 6.65. Packie's factor becomes 4.66 when P is expressed in lb./sq. in. absolute, although his equation is applicable to crude distillation equipment, whereas the equation expressed above has been developed for gasoline distillation equipment.

Solving the preceding equation, where

T = 154 + 460 = 614° R
S = 0.493 at 154° F.
M = 58
P = 113 lb./sq. in. absolute

gave $V_c = 0.87$ ft./sec.

III. Calculation of Actual Vapor Velocity at Top of Tower

$$\text{Vapor volume} = \frac{\text{Total overhead}}{\text{Molecular weight}} = \frac{12{,}610 \text{ lb./hr.}}{58} = 217 \text{ lb. moles/hr. at standard conditions.}$$

This was corrected to conditions at the top of the tower as follows: (Refer to Fig. 5.)

Pseudo critical pressure = 530 lb./sq. in. absolute (Smith and Watson[14]).

$$\text{Reduced pressure} = \frac{113}{530} = 0.21.$$

Pseudo critical temperature = 735° R (Smith and Watson[14]).

$$\text{Reduced temperature} = \frac{614}{735} = 0.84.$$

From reduced pressure and reduced temperature data prepared by Lewis,[15] the compressibility factor μ was determined to be equal to 0.833. This was used to correct the actual vapor volume for deviations from the perfect gas laws as follows:

$$\text{Vapor volume} = 217 \times 0.833 \times \frac{14.7}{113} \times \frac{614}{520} \times \frac{379}{3600} = 2.93 \text{ cu. ft./sec. (corrected)}$$

$$\text{Vapor velocity} = \frac{2.93}{9.0} = 0.33 \text{ ft./sec. in free area of tower at top}$$

$$\text{Vapor velocity} = \frac{2.93}{1.055} = 2.78 \text{ ft./sec. in slots on top plate}$$

From the above it can be seen that the free area vapor velocity at the top of the tower was considerably under the critical condition for Test VI.

IV. Downcomer Velocity at Top of Tower

$$\frac{\text{Internal reflux}}{\text{Lb./gal.}} = \frac{10{,}580 \text{ lb./hr.}}{4.74} = 2{,}230 \text{ gal./hr. at standard conditions.}$$

Liquid cu. ft./sec. at top tower conditions were calculated as follows:

$$\text{Liquid volume} = \frac{2{,}230}{3600} \times \frac{.569}{.49} \times \frac{1}{7.48} = 0.095 \text{ cu. ft./sec.}$$

$$\text{Velocity in top of downcomer} = \frac{0.095}{0.444} = 0.21 \text{ ft./sec.}$$

$$\text{Velocity under downcomer} = \frac{0.095}{0.357} = 0.27 \text{ ft./sec.}$$

These downcomer velocities are relatively low.

V. Vaporization in Reboiler

This quantity was calculated by equating the difference between total heat in and out of the tower in B.t.u./hr. equal to total heat added in the reboiler. The difference between total heat added in the reboiler and sensible heat added in the reboiler in B.t.u./hr. gave the heat added for vaporization. Dividing this by the total heat of the reboiler vapors in B.t.u./lb. gave the pounds vaporized in the reboiler. These were determined as follows (temperatures are given in Table X):

(Datum plane is 60° F. throughout)

(1) Total (sensible) heat entering in feed at 79° F., 30,200 (79-60) (.513) (1.045) = 307,500 B.t.u./hr.

(2) Total (sensible) heat leaving in bottoms through first exchanger, 26,050 (293-207) (.617) (1.022) = 1,543,000 B.t.u./hr.

(3) Total (sensible) heat leaving in bottoms through second exchanger, 26,050 (207-147) (.571) (1.022) = 913,000 B.t.u./hr.

(4) Total (sensible) heat leaving in bottoms through cooler, 26,050 (147-85) (.535) (1.022) = 884,000 B.t.u./hr.

(5) Total (sensible) heat leaving in bottoms at 85° F., 26,050 (85-60) (.509) (1.022) = 339,000 B.t.u./hr.

(6) Sensible heat in unvaporized bottoms through reboiler, 26,050 (297-290) (.641) (1.022) = 119,300 B.t.u./hr.

(7) Total heat removed in condensers = 1,912,000 B.t.u./hr.

(8) Total heat in overhead produced leaving reflux drum = 99,600 B.t.u./hr.

TABLE VI.—HEAT EXCHANGER PERFORMANCE (Calculated Result X) BOTTOMS-FEED EXCHANGER NO. 2

Service:	Test I	Test II	Test III	Test IV	Test V	Test VI
Shell side	Stabilized Liquid Bottoms					
Tube side	Raw Feed Liquid & Vapors					
Effective external area, sq.ft.	567					
Log mean temp. difference (uncorrected)	51	47.5	50.5	49	73	61
Heat transferred, B.t.u./hr. × 10^3	522	487	885	561	1,530	913
Approach temp. (hot end) °F.	46	43	49	43	65	53
Approach temp. (cold end) °F.	56	52.5	52	56	82	68
U—B.t.u./(hr.)(sq.ft.)(°F.)*	18.1	18.1	30.9	20.2	36.9	26.4
Shell Side:						
Temp. in, °F.	183	175	191	179	234	207
Temp. out, °F.	122	118.5	119	122	169	147
Lb./hr. liquid in	14,950	15,200	21,350	17,000	39,750	26,050
°A.P.I., liquid in	72.1	71	73.1	74.4	66.9	70.3
Mid-boiling point, °F., liquid in	162	164	158	154	194	171
Tube Side:						
Temp. in, °F.	66	66	67	66	87	79
Temp. out, °F.	137	132	142	136	169	154
Lb./hr. liquid in	20,940	20,135	26,640	20,720	43,095	30,200
°A.P.I., liquid in	82.2	81.1	81.1	81.8	70.7	76.4
Mid-boiling point, °F., liquid in	141	141	141	141	193	168

Tube Data:	No.	O.D."	Ga.	Lgth."	Material
	270	⅝	18	155	Admiralty

* NOTE: Good design transfer rate for this type unit when clean is $U = 60$ B.t.u./(hr.)(sq.ft.)(°F.).

TABLE VII.—HEAT EXCHANGER PERFORMANCE (Calculated Result X) BOTTOMS COOLER

Service:	Test I	Test II	Test III	Test IV	Test V	Test VI
Shell side	Stabilized Liquid Bottoms					
Tube side	Water					
Effective external area, sq.ft.	567					
Log mean temp. difference (uncorrected)	35.5	33.7	42.5	41.0	51.2	29.5
Heat transferred, B.t.u./hr. × 10^3	426	403	451	462	1,480	884
Approach temp. (hot end) °F.	55.5	52.5	49.0	56.5	76.5	53.0
Approach temp. (cold end) °F.	22	20	37	29	32	14.3
U—B.t.u./(hr.)(sq.ft.)(°F.)*	21.1	21.1	18.7	19.9	50.6	52.8
Shell Side:						
Temp. in, °F.	122	118.5	119	122	169.5	147
Temp. out, °F.	69	69	80	72	102.5	85
Lb./hr. liquid in	14,950	15,200	21,350	17,000	39,750	26,050
°A.P.I., liquid in	72.1	71	73.1	74.4	66.9	70.3
Mid-boiling point, °F., liquid in	162	164	158	154	194	171
Tube Side:						
Temp. in, °F.	47	49	43	43	70.5	70.7
Temp. out, °F.	66.5	66	70	65.5	93	94
Gal./min. (calculated)	44	47	33	41	131	76
Lb./hr. (calculated)	21,850	23,700	16,700	20,500	65,700	37,900

Tube Data:	No.	O.D."	Ga.	Lgth."	Material
	270	⅝	18	155	Admiralty

* NOTE: Good design transfer rate for this type unit when clean is $U = 60$ B.t.u./(hr.)(sq.ft.)(°F.).

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CHLORINE

Specifications: Clear, amber colored liquid; about 1½ times as heavy as water; conforms with American Water Works Association specifications:

Available Literature: 20-page booklet "Monsanto Chlorine."

MURIATIC ACID (Hydrochloric Acid)

Grades: 18° Bé; 20° Bé; 22° Bé.

Specifications: 18° Bé., 27.9% HCl; 20° Bé., 31.5% HCl; 22° Bé., 35.2% HCl. Sulfates (H_2SO_4) 1.01% max.; iron (Fe) 0.001% max.; arsenic trioxide (As_2O_3) 0.0001% max.

PHENOL

Standard Forms: Crystalline solid, U.S.P.; liquid 85%; liquid 88%.

Specifications of Crystalline Solid, U.S.P.: White crystalline solid; melt, colorless mobile liquid; solution in water (1:15), clear and colorless; non-volatile residue (100°C.), 0.04% max.; crystallizing point 40.0°C. min. Distilling range: first drop, 180.0°C. min.; 100% (first drop to dry point), 2.0°C. max.; 50% to dry point, 0.2°C. max.

Specifications of Liquids: Colorless mobile liquids. Assay: liquid 85%, 85.0-86.0%; liquid 88%, 88.0-89.0%.

PHOSPHORIC ACID (Orthophosphoric Acid)

Standard Forms: 50%, 75% and 85% H_3PO_4. Other concentrations supplied on request.

Characteristics: Clear, water-white liquid miscible with water in all proportions.

"SANTOLENE A"

Characteristics: Liquid or low melting point solid; b. p. at 2 mm., 150°-160°C.; viscosity at 25°C., 818 centipoises; sp. g. at 25°C., 1.00; miscible in all proportions with gasoline; solubility in water, less than 0.05%.

General Information: A gasoline anti-oxidant.

Available Literature: 3-page bulletin "Santolene A—a gasoline anti-oxidant."

"SANTOLUBES 394, 394-A"

General Information: Both are anti-oxidant type additives for automotive crankcase lubricants and similar type oils. 394-A type has better oil solubility and has pour point depressant value. Since neither is a detergent type additive and no cresol is used in their manufacture, the use of either is allowed in all types of oils for all applications by existing recommendations of the Office of Petroleum Coordinator.

Available Literature: Preliminary technical bulletin issued June, 1942.

"SANTOLUBE 303"

General Information: A detergent type additive for automotive crankcase lubricants and similar type oils with sufficient pour point depressant effect for most uses. For anti-oxidant value Santolube 394 should be used with 303. O.P.C. recommendations limit the use of Santolube 303 to military and other government uses, Diesel engine and heavy duty gasoline engine requirements.

Available Literature: Preliminary Pamphlet, May, 1942.

"SANTOPOID S"

Standard Form: Oily, homogeneous liquid.

General Information: Used up to 10% blended with suitable mineral oil to produce extreme pressure lubricants for hypoid and other gears. An approved additive to meet Federal Specification VV-L-761.

Available Literature: Application Data Bulletin No. 117 "Santopoid."

"SANTOPOUR"

Characteristics: Gravity, 26.7°A.P.I.; flash, 485°F.; pour, 10°F.; viscosity, S.U. at 210°F., 156.4; carbon residue, 1.4; color, NPA (85 and 15), 6; neutralization number, 1.20.

General Information: An improved pour point depressant for lubricating oils. Lowers the pour point of wax-bearing oils as much as 50°F. Stable under extreme service conditions.

Available Literature: Application Date Bulletin No. 120, "Santopour."

SULFURIC ACID

H_2SO_4

Standard Strength: 60° Bé; 66° Bé; 98% H_2SO_4; Oleum.

Specifications: 60° Bé: 77.67% min. H_2SO_4; freezing point, 12.6°F. approx.
66° Bé: 93.2% min. H_2SO_4; freezing point, 29°F. approx.
98%: 98.0% min. H_2SO_4; freezing point, 32°F. approx.
Oleum— 20% SO_3: 104.50% min. H_2SO_4; freezing point, 23.0°F.
25% SO_3: 105.6% min. H_2SO_4; freezing point, 48.5° F.

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Summarizing the above:

Heat Entering Tower B.t.u./hr.	
(1)	307,500
(2) & (3)	2,456,000
Totals	2,763,500
Heat Leaving Tower B.t.u./hr.	
(2) & (3)	2,456,000
(4)	884,000
(5)	339,000
(7)	1,912,000
(8)	99,600
	5,690,600
(—) Heat entering	2,763,500
Reboiler duty	2,927,100
(—) (6)	119,300
Heat for vaporization in reboiler	2,807,800

$$\text{Pounds vaporized in reboiler} = \frac{2{,}807{,}800 \text{ (B.t.u./hr.)}}{109 \text{ (B.t.u./lb.)}}$$

$= 25{,}750$ lb./hr.

Reboiler weight vaporization to bottoms product ratio

$$= \frac{25{,}750}{26{,}050} = 0.99/1.$$

VI. Calculation of Limiting Vapor Velocity in Free Area at Bottom of Tower

Solving the critical velocity formula shown in (II) where:

$T = 297 + 460 = 757°$ F.
$S = .582$ at 297° F.
$M = 87$
$P = 121$ lb./sq. in. absolute
gave $V_c = 0.83$ ft./sec.

VII. Calculation of Actual Vapor Velocity at Bottom of Tower

$$\text{Vapor volume} = \frac{\text{Lbs. vaporized in reboiler}}{\text{Molecular weight}} = \frac{25{,}750}{87}$$

$= 296$ lb. moles/hr. at standard conditions

Correcting to conditions at bottom of tower (see Table X), using method illustrated in (III) gave:

Pseudo critical pressure = 460 lb./sq. in. absolute

$$\text{Reduced pressure} = \frac{121}{460} = 0.26$$

Pseudo critical temperature = 935° R.

$$\text{Reduced temperature} = \frac{757}{935} = 0.81$$

Using reduced pressure and temperature as calculated above gave a compressibility factor of 0.765. The corrected vapor volume then became:

$$\text{Vapor volume} = 296 \times 0.765 \times \frac{14.7}{121} \times \frac{757}{520} \times \frac{379}{3600}$$

$= 4.23$ cu. ft./sec.

$$\text{Vapor velocity} = \frac{4.23}{9.0} = 0.47 \text{ ft./sec. in free area of tower at bottom.}$$

$$\text{Vapor velocity} = \frac{4.23}{1.055} = 4.01 \text{ ft./sec. in slots on bottom plate.}$$

The above figures show that the vapor velocities obtained at the bottom of the tower were also well below the critical for Test VI.

VIII. Downcomer Velocity at Bottom of Tower

$$\frac{\text{Reboiler vapors}}{\text{Lb./gal. conditions}} = \frac{25{,}750}{5.79} = 4{,}460 \text{ gal./hr. at standard conditions}$$

$$\frac{\text{Reboiler liquid}}{\text{Lb./gal. conditions}} = \frac{26{,}050}{5.84} = 4{,}460 \text{ gal./hr. at standard conditions}$$

Total downcomer liquid into reboiler = 8,920 gal./hr.

Liquid cu. ft./sec. at bottom tower conditions were calculated as follows:

$$\text{Liquid volume} = \frac{8{,}920}{3{,}600} \times \frac{.698}{.575} \times \frac{1}{7.48} = 0.40 \text{ cu. ft./sec.}$$

$$\text{Velocity in top of downcomer} = \frac{0.40}{0.444} = 0.9 \text{ ft./sec.}$$

$$\text{Velocity under downcomer} = \frac{0.44}{0.357} = 1.12 \text{ ft./sec.}$$

Both of these downcomer velocities are above what is considered good design conditions, i. e., 0.8 ft./sec.

Tabulation of Results and Data

This section summarizes the results and data obtained on all six tests in the following table:

Table I. Items I-VIII inclusive, illustrative calculations for which were given in the preceding section.

Table II. Tower performance and per cent separation obtained.

Tables III-VII. Heat exchanger performance.

Table VIII. Podbielniak analyses on test samples.

Table IX. Laboratory inspection data on test samples.

Table X. Crude naphtha stabilizer operating data.

Discussion of Results and Data

Unfortunately, the time available did not

TABLE VIII.—PODBIELNIAK ANALYSES

	Test I	Test II	Test III	Test IV	Test V	Test VI
CONDENSED OVERHEAD PRODUCT (See Note)						
Hydrocarbon	Liq. %*	Liq. %†	Liq. %	Liq. %	Liq. %	Liq. %
Ethane	0.20	0.32	0.31	0.82	2.24	2.14
Propane	9.85	10.04	12.99	19.84	21.74	22.54
Iso-butane	6.66	7.75	9.45	10.37	7.79	10.82
Normal butane	48.44	54.98	69.44	67.81	45.67	48.78
Iso pentane	20.50	17.27	5.44	1.16	8.73	8.55
Normal pentane	14.35	9.64	2.37		12.62	6.81
Hexanes and heavier	.....	.....	.....	.....	1.21	0.36
	100.00	100.00	100.00	100.00	100.00	100.00
STABILIZED BOTTOMS						
Hydrocarbon	Liq. %	Liq. %	Liq. %	Liq. %	Liq. %	Liq. %
Iso-butane	.....	.....	.....	0.25	0.68	.....
Normal butane	.....	.....	.....	1.85	2.05	0.51
Iso-pentane	2.92	3.60	100.00	97.90	5.11	5.81
Normal pentane	17.57	17.20			7.71	12.93
Hexanes and heavier	79.51	79.20			84.45	80.75
	100.00	100.00	100.00	100.00	100.00	100.00
Grav., °A.P.I. of hexanes and heavier	66.0	65.8	73.1	73.1	62.2	65.3

* Distillation on residue from this sample when weathered gave a dry point of 96° F.

† Distillation on residue from this sample when weathered gave a dry point of 98° F.

NOTE: All percentages listed are actual liquid volume per cent.

TABLE X.—CRUDE NAPHTHA STABILIZER TEST OPERATING DATA

Rates, bbls./day (42 gal	Test I	Test II	Test III	Test IV	Test V	Test VI
Raw feed	2,175	2,075	2,750	2,150	4,230	3,045
Stabilized bottoms	1,480	1,495	2,120	1,700	3,830	2,545
Overhead production	695	580	630	450	400	500
External reflux	3,990	2,810	2,000	1,500	700	1,020
Pressures, lb./sq.in. gauge						
Steam	136	136	136	136	132	131
Feed drum	17	18	15	16	25	30
Bottom of tower	120	109	109	94	117	106
Overhead into condensers*	.....	.....	.....	.....	113.5	98
Reflux drum	95	81	98	89	110	93
Temperatures, °F.						
Feed to No. 2 bottoms exchanger	66	66	67	66	87	79
Feed from No. 2 bottoms exchanger	137	132	142	136	169	154
Feed from No. 1 bottoms exchanger	233	223	229	217	247	224
Tower center	240	229	214	157	227	200
Bottoms to reboiler	300	295	285	268	310	290
Bottoms from reboiler	316	309	297	277	321	297
Bottom of tower	308	302	287	266	315	293
Bottoms out No. 1 bottoms exchanger	183	175	191	179	234	207
Bottoms out No. 2 bottoms exchanger	122	118.5	119	122	169	147
Bottoms out cooler	69	69	80	72	102.5	85
Water to cooler	47	49	43	43	70.5	70.7
Water from cooler	66.5	66	70	65.5	93	94
Top tower	178	158	151	132	163	150
Overhead into top condenser	173	150	147	129	161	147
Overhead out top condenser	162	138	141	124	132	122
Overhead out lower condenser	133	115	119	104	96	102
Water to lower condenser	47	49	43	43	70.5	70.7
Water from lower condenser	88	71.5	67.5	60.5	87	81.5
Water from top condenser	141.5	112	112	101	125	102.5

*(No connection for first 4 tests)

permit of a more theoretical treatment by the calculation of plate efficiencies using plate-to-plate calculation methods. However, it is hoped that sufficient data has been offered to allow such calculations to be made in the future.

Because of the number of variables involved, it was felt that the results expressed in Tables I, II and VIII would appear to better advantage in tabular form rather than graphical. A study of these two tables reveals that only in Test I was the limiting vapor velocity exceeded, and then only slightly in both top and bottom sections of the tower. This apparently did not impair the fractionation to any great extent, although in Test II, with lower vapor velocities, a better quality of overhead product was obtained, with relation to isopentane concentration. However, a comparison of the results obtained in Test I and II with those in V and VI, especially in regard to down-comer liquid velocities, is very interesting as shown below.

High downcomer velocities in Tests I and II were brought about by the use of large quantities of outside reflux, causing high internal reflux ratios in both the top and bottom sections. Here again lower velocities apparently favored the fractionation in Test II over I. In Tests V and VI, high downcomer velocities were brought about by the use of high feed rates, with a resultant definite limitation in the quantity of external reflux possible to pump back to the tower. This in turn resulted in low internal reflux ratios in both the top and bottom sections of the tower, with a marked decrease in fractionating efficiency. This was evidenced by the quantities of butane left in the bottoms, while hexanes were present in the overhead. Test V, with a much higher feed rate than Test VI, gave much poorer results, while both these tests suffer by comparison with I and II, neither of which had any butanes in the bottoms or hexanes in the overhead.

Tests III and IV, in which a cut was attempted in the overhead product between normal butane and isopentane gave good results. Each test was well below the limiting vapor velocities in both top and bottom sections. However, Test III, with higher downcomer velocities than IV, showed a poorer overhead cut, containing considerably more pentanes. In both these tests, high downcomer velocities were maintained by the use of quantities of external reflux, with resultant high ratios of internal reflux in the top and bottom sections of the tower.

Tables III through VII present data and results on the heat exchanger performance obtained during the 6 tests. In nearly every case, the overall external heat transfer coefficients vary directly with the velocity or quantity of the materials passing through them.

Table IX presents laboratory inspection data results, indicating the degree of front end separation of each of the stabilized bottoms products.

Table X presents average test data as obtained in the field and as used in all the calculations reported in this paper.

Conclusions

It is believed that the following points have been brought out and can be considered to hold generally for bell-cap fractionating towers with 18-in. tray spacing and of the general design reported:

I—For identical quantities of reboiler liquid entering a reboiler:

(A) Fractionation suffers from flooding and downcomer liquid velocities in lower portion of tower become excessive at following rates:

(1) 1.5 ft./sec. when reboiler weight vaporization to bottoms ratio is held above 3 to 1.

(2) 1 ft./sec. when reboiler weight vaporization to bottoms ratio is held above 1.5 to 1.

(B) Fractionation is satisfactory when downcomer liquid velocities in lower portion of tower are maintained below following rate:

(1) 0.9 ft./sec. when reboiler weight vaporization to bottoms ratio is maintained at a minimum of 1.4 to 1.

II—Fractionation suffers somewhat when actual vapor velocities in either top or bottom sections of the tower exceeds the critical velocities as calculated by the formula:

$$V_c = 4.04 \sqrt{\frac{TS}{MP}}$$

Acknowledgment

Grateful acknowledgment is made to Lester D. Mills, Jr., of the Latonia Refining Corp., for his assistance in the preparation of the drawings included in this manuscript.

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TABLE IX.—LABORATORY INSPECTION DATA STABILIZED BOTTOMS

	Test I	Test II	Test III	Test IV	Test V	Test VI
Reid vapor pressure, lbs./sq.in.	6.2	6.3	7.0	8.1	6.3	6.5
Gravity, °A.P.I.	71.1	71.0	73.1	74.4	66.9	70.3
I.B.P., °F.	120	122	114	102	110	108
10%	138	139	130	122	147	140
20%	144	145	137	132	159	148
30%	150	151	144	140	172	155
40%	156	157	151	146	183	164
50%	162	164	158	154	194	171
60%	172	173	168	164	204	181
70%	182	182	180	178	215	191
80%	196	196	193	192	230	205
90%	222	219	220	220	258	228
End point, °F.	302	310	302	302	320	304
% Recovery	98	99	98	98	99	99
% Residue	1	0.5	1	1	1	1
% Loss	1	0.5	1	1	—	—

LABORATORY INSPECTION DATA RAW STRAIGHT-RUN FEED

	Tests I-IV	Test V	Test VI
Reid vapor pressure, lbs./sq.in.	23.0	15.8	21.0
Gravity, °A.P.I.	81.5	71.3	77.4
I.B.P., °F.	78	76	60
10%	96	123	106
20%	112	145	124
30%	124	164	141
40%	138	179	155
50%	152	193	168
60%	166	205	180
70%	182	219	195
80%	206	237	214
90%	...	287	292
End point, °F.	292	318	294
% Recovery	89	93	90.5
% Residue	1	1	1.0
% Loss	10	6	8.5

Influence of Sulfur Compounds . . .

PART 2

On 'Gas' Octane Number And Lead Susceptibility

The accompanying portion of the article by Dr. Ryan shows the application of the procedure for calculating the lead susceptibility of gasoline stocks from analyses of their sulfur content, to a blend of two or more stocks of similar hydrocarbon composition but varying sulfur content. The practical value of the procedure is in its offering refiners a means to conserve in the use of tetraethyl lead in the manufacture of high octane gasolines.

Part 1, published in Technical Section of NPN July 29, p. R-234, described earlier steps in the procedure; first, addition of purified sulfur compounds to a reformed gasoline of very low sulfur content and, second, evaluation of quantitative effect upon octane number and lead susceptibility.

By Julian G. Ryan*

THE effect, upon octane number and lead response, of various sulfur compounds added to a low-sulfur (0.005%wt.) straight-run gasoline of 51 octane number and to a blend of 65% of isooctane in n-heptane has been reported in the literature by Schulze and Buell (20) and Birch and Stansfield (1). The octane numbers and both the measured and calculated lead-susceptibility values are shown in table 7. (The 0.005%wt. of residual sulfur is assumed to consist of half thioether and half ring sulfur, which corresponds to a reduction in lead susceptibility of ten per cent.)

Close agreement between the lead susceptibility values determined experimentally and the values calculated from the sulfur content is observed for the straight-run gasoline in table 7. Only in two instances is the difference greater than 0.10, both cases having a high sulfur content outside the range ordinarily encountered. Inasmuch as only meager data for the blend of 65% of isooctane in n-heptane are available (two concentrations of tetraethyl lead, octane numbers being reported to the nearest 0.5), a less precise correlation is observed in this case. However, the results serve to show that the relation between sulfur content and lead susceptibility may be entirely independent of hydrocarbon composition.

Effect of Sulfuric-Acid Treatment on Lead Susceptibility of Cracked Gasolines

Data reported in the literature by Graves (6) also indicate that the relation between lead susceptibility and concentration of various types of sulfur compounds is independent of hydrocarbon composition, if the change in lead susceptibility is expressed as the percent decrease from the value of the sulfur-free stock. In table 8 is shown the effect, upon concentration of various sulfur types and upon lead susceptibility, of treating Dubbs cracked gasoline from mixed California residuum with 98% sulfuric acid at a low temperature (20° F).

In table 9 are given the equivalent concen-

Table 8—Effect of Sulfuric-Acid Treatment at 20 F. upon Sulfur Content and Lead Susceptibility of Cracked Gasoline

(Data from Graves)

	Acid Consumption, lb. bbl.		
Sulfur Content, %wt.	**10.5**	**21.0**	**31.5**
Total	0.433	0.20	0.084
Disulfide	0.013	0.004	0.005
Thioether	0.025	0.006	0.004
Residual (Rings)	0.395	0.190	0.079
Octane Number, ASTM-CFR			
0 cc TEL/Gal.	69.7	69.0	68.0
0.5 cc TEL/Gal.	71.5	72.0	72.5
1.0 cc TEL/Gal.	73.5	74.5	75.5
2.0 cc TEL/Gal.	75.5	76.5	77.5
Lead Susceptibility (Calculated from above data)	0.60	0.77	0.96

Table 7—Effect of Sulfur Compounds upon the Octane Number and Lead Response of Straight-Run Gasoline and 65% of Isooctane in n-Heptane

(Data from Schulze and Buell and Birch and Stansfield)

Gasoline	Sulfur Compound Added, %wt.	Conc., %wt. of S	Oct. No. at cc TEL/Gal* 0	1	2	3	6	Measured Lead Suscept.	Calc. Lead Suscept.
Straight-run	None	0.005	51.0	63.5	70.7	74.4	79.5	1.93	....
	None	0.000	51.0	63.5	70.7	74.4	79.5	....	2.14
	Ethyl Disulfide	0.024	50.6	60.2	66.2	70.3	76.3	1.53	1.54
	Ethyl Disulfide	0.046	50.3	59.6	64.9	68.5	74.5	1.35	1.39
	Ethyl Disulfide	0.113	50.3	57.8	61.6	64.2	70.7	1.00	1.09
	Ethyl Disulfide	0.412	48.4	52.4	55.6	58.2	64.5	0.80	0.48
	n-Butyl Disulfide	0.066	50.6	58.7	63.6	66.5	72.7	1.20	1.28
	iso-Butyl Disulfide	0.030	50.3	59.6	65.8	69.5	75.8	1.48	1.49
	Methyl Sulfide	0.024	50.6	62.2	67.7	71.6	78.4	1.71	1.69
	Methyl Sulfide	0.238	51.0	58.6	63.3	66.7	73.8	1.24	1.13
	Ethyl Sulfide	0.030	51.0	61.9	67.4	71.4	77.8	1.64	1.66
	iso-Amyl Sulfide	0.031	50.6	60.4	66.1	69.9	76.4	1.55	1.64
	Thiophene	0.095	51.0	60.5	66.4	69.8	76.3	1.54	1.61
65% of Isooctane in n-Heptane	None	.....	65.0	76.0	....	84.0	....	2.3	....
	Ethyl Mercaptan	0.10	64.0	....	....	76.0	....	1.2	1.2
	iso-Amyl Mercaptan	0.10	63.0	70.0	....	76.5	....	1.3	1.2
	Ethylene Mercaptan	0.10	63.5	68.5	....	74.5	....	1.0	1.2
	Ethyl Disulfide	0.10	65.0	69.5	....	75.0	....	1.0	1.2
	iso-Amyl Disulfide	0.10	64.5	70.5	....	76.0	....	1.1	1.2
	Ethyl Sulfide	0.10	65.0	72.0	....	78.0	....	1.3	1.5
	iso-Amyl Sulfide	0.10	65.0	72.0	....	78.0	....	1.3	1.5
	Penta-methylene Sulfide	0.10	65.5	71.5	....	78.0	....	1.2	1.5
	Thiophene	0.10	65.0	72.3	....	81.0	....	1.7	1.7

*Results for isooctane and n-heptane are cc per Imperial gallon, which is equivalent to 0.84 cc per U. S. gallon.

*Shell Oil Co., Inc., Wood River, Ill.

**Presented before the Petroleum Division, American Chemical Society, April 21, Memphis, Tenn.

Table 9—Effect of Sulfuric-Acid Treatment at 20 F. upon Equivalent Disulfide-Sulfur Content and Calculated Lead Susceptibility at Zero Sulfur Content

	Acid Consumption, lb. bbl. 10.5	21.0	31.5
Equivalent Conc. of RSSR, %wt. S	0.095	0.041	0.016
Calc. % Decrease in Lead Susceptibility	46	34	24
Calc. Lead Susceptibility, sulfur-free	1.11	1.17	1.26

trations of disulfide sulfur, the percent decrease in lead susceptibility, and the calculated lead-susceptibility values of the sulfur-free stocks computed from the data in table 8.

It is seen from tables 8 and 9 that sulfuric-acid treatment, in addition to decreasing the sulfur content and increasing lead susceptibility, has increased the calculated lead susceptibility at zero sulfur content. This can be attributed to removal of diolefins and perhaps some of the more reactive olefins. This interesting application of the method illustrates its usefulness in removing the obscuring effect of sulfur in evaluating a refining procedure.

In table 10 are shown results taken from the same source (6) indicating the effect of the addition to the two more severely treated samples of a mixture of sulfur compounds of the types and in the amounts present in the 10.5 pounds per barrel treatment. Sulfur compounds used included n-amyl disulfide, n-propyl sulfide, and dimethyl thiophene.

Table 10—Effect of Adding Sulfur Compounds to Sulfuric-Acid Treated Gasolines to Duplicate the Sulfur Content of the 10.5-Pound per Barrel Treatment

(*Data from Graves*)

Sulfur Content, %wt.	Acid Consumption, lb. bbl. 10.5	21.0	31.5
Total	0.433	0.44	0.42
Disulfide	0.013	0.013	0.013
Thioether	0.025	0.025	0.025
Residual (Rings)	0.395	0.395	0.395
Octane Number, ASTM-CFR			
0 cc of TEL/Gal.	69.7	69.0	68.0
0.5 cc TEL/Gal.	71.5	71.0	70.0
1.0 cc TEL/Gal.	73.5	73.0	72.0
2.0 cc TEL/Gal.	75.5	75.0	74.5
Lead Susceptibility, measured	0.60	0.62	0.67
Lead Susceptibility, calculated from sulfur-free values (Table 9) and sulfur content	0.60	0.63	0.63

The percent decrease in lead susceptibility from the value of the sulfur-free stocks, as calculated from the results given in Tables 9 and 10, is found to be 46%, 47%, and 47% for the 10.5-, 21.0-, and 31.5-lb. per bbl. treatments, respectively. The close agreement in these results indicates again that the effect of sulfur compounds is independent of the changes in hydrocarbon composition involved. These results also offer confirmation that the effect of the various sulfur types upon lead susceptibility is independent of the structure of the sulfur types.

Effect of Octane-Number Level Upon Results of Lead-Susceptibility Calculations

The aforementioned tests of the method for computing lead-susceptibility values from sulfur analyses indicate it to provide satisfactory results in the octane-number range, 50-75. Tests of the method in a higher octane-number region have been made by adding sulfur compounds to blends of Rodessa reformed gasoline with isooctane and with diisobutylene.

In table 11 is shown the effect of n-butyl disulfide upon the lead susceptibility of 50:50 blends of Rodessa reformed gasoline with isooctane and with diisobutylene.

From group-sulfur analyses and the relation between the effects of various sulfur types upon lead susceptibility are obtained the equivalent disulfide-sulfur content and the corresponding percent decrease in lead susceptibility from the value of the sulfur-free stock. These data, as well as a comparison of the calculated and measured lead susceptibility values, are given in table 12.

From the results shown in table 12, it is seen that the calculated and measured lead-susceptibility values are in good agreement for blends of Rodessa reformed gasoline with isooctane and diisobutylene, (with and without added n-butyl disulfide). It therefore appears that the method of computing lead susceptibility from sulfur analyses will give satisfactory results at octane numbers as high as 84.

Table 11—Effect of n-Butyl Disulfide upon Lead Susceptibility of Blends

Gasoline	Sulfur Compound Added	Total Sulfur Content, %wt.	Octane No. at cc TEL/Gal. 0	0.5	1.0	2.0	3.0	Lead Suscept.
50% of Rodessa Reformed + 50% of Isooctane	None	0.0021	83.5	87.3	90.2	92.1	93.3	1.33
50% of Rodessa Reformed + 50% of Isooctane	n-Butyl-Disulfide	0.062	—0.9	—2.2	—4.0	—3.9	—3.9	0.81
50% of Rodessa Reformed + 50% of Diisobutylene	None	0.0023	84.2	86.4	82.0	88.0	88.5	0.46
50% of Rodessa Reformed + 50% of Diisobutylene	n-Butyl Disulfide	0.054	—0.6	—1.9	—1.8	—2.1	—2.0	0.30

Table 12—Comparison of Calculated and Measured Lead Susceptibility Values of Blends Containing n-Butyl Disulfide

Gasoline	Equivalent RSSR %wt. of S	Percent Decrease in Lead Suscept.	Calculated Sulfur-Free Lead Suscept.	Lead Suscept. Calc.	Measured
50% of Reformed + 50% of Isooctane	0.0006	7	1.43	....	1.33
50% of Reformed + 50% of Isooctane	0.060	39	1.43	0.87	0.81
50% Reformed + 50% of Diisobutylene	0.0007	8	0.50	....	0.46
50% Reformed + 50% of Diisobutylene	0.051	37	0.50	0.32	0.30

Applications of Method for Computing Improvement In Lead Susceptibility from Sulfur Analysis

Calculation of Improvement Obtained by Solutizer Treatment

The following data illustrate the method of calculating the improvement to be gained in lead susceptibility by this process taken from a study of solutizer sweetening (26).

The average octane numbers at various concentrations of tetraethyl lead are shown in table 13 for 17 cracked gasolines before (sour) and after solutizer sweetening.

The average mercaptan sulfur content of these gasolines was 0.065%wt. and the average total sulfur was 0.261%wt. The proportions of thioethers and ring-sulfur compounds was not determined; for the sake of illustration, the ratio of ring-sulfur to thioether sulfur will be assumed to be two to one. This gives a sulfur content of 0.065%wt. of mercaptan, 0.065%wt. of thioether, and 0.131%wt. of ring sulfur. The calculated sulfur-free lead susceptibility is 1.44.

For the solutizer treated samples, a calculated lead-susceptibility value of 0.91 is obtained, as compared with the measured value of 0.95. Variation of the assumed ratio of ring sulfur to thioether sulfur does not sensibly alter this result. Thus, the assumption of a one-to-one ratio gives a calculated lead susceptibility for solutizer treatment of 0.90, and a sulfur-free lead susceptibility of 1.48.

A similar calculation can be made for the

Table 13—Effect of Solutizer Sweetening upon Average Octane Number and Lead Susceptibility of Seventeen Cracked Gasolines

Condition of Gasolines	Oct. No. at cc TEL/Gal. 0	1.0	2.0	3.0	Lead Suscept.
Sour	67.4	71.9	74.3	75.9	0.73
Solutizer Sweetened	0.35	+1.21	+1.46	+1.55	0.95

Table 14—Effect of Solutizer Sweetening on Average Octane Number and Lead Susceptibility of Eight Straight-Run Gasolines

Condition of Gasolines	ASTM Oct. No. at cc TEL/Gal. 0	1.0	2.0	3.0	Lead Suscept.
Sour	57.9	65.9	70.3	73.2	1.28
Solutizer Sweetened	+0.65	+1.71	+2.10	+2.28	1.54

Table 15—Effect upon Lead Susceptibility of Blending High-Sulfur Cracked Gasoline with Low-Sulfur Reformed Gasoline

Gasoline	Octane Number at cc TEL per Gallon 0	0.5	1.0	2.0	3.0	Lead Suscept.
Rodessa Reformed	71.0	75.8	78.9	81.9	83.5	1.29
High-Sulfur Cracked	66.2	68.4	70.1	71.6	73.6	0.52
50:50 Blend	66.6	69.3	70.8	73.6	74.9	0.69

Table 16—Effect upon Lead Susceptibility of Blending High-Sulfur Cracked Gasoline with Rodessa Reformed Gasoline

Proportions in Blend, % vol. High-Sulfur Cracked	Low-Sulfur Reformed	Equiv. RSSR, %wt. of S	Percent-Decrease in Lead Suscept.	Calculated Sulfur-Free* Lead Suscept.	Lead Suscept. Calc.	Lead Suscept. Measured
0	100	0.0011	9	1.41	...	1.29
10	90	0.020	26.5	1.39	1.02	....
20	80	0.039	33.5	1.38	0.92	....
30	70	0.058	39	1.37	0.84	....
40	60	0.077	43	1.36	0.77	....
50	50	0.0955	47	1.35	0.71	0.69
60	40	0.114	40	1.34	0.67	....
70	30	0.133	53	1.33	0.63	....
80	20	0.152	55.5	1.32	0.59	....
90	10	0.171	58	1.31	0.55	....
100	0	0.190	60	1.30	....	0.52

*It is assumed that the sulfur-free lead susceptibility values, 1.41 and 1.30, will combine linearly since these gasolines are of similar hydrocarbon composition.

average results of eight straight-run gasolines examined (26). The octane numbers and lead susceptibility values are given in Table 14.

The average mercaptan sulfur of the straight-run gasolines was 0.046%wt., and the average total sulfur was 0.136%wt. A two-to-one ratio of ring sulfur to thioether sulfur will again be assumed.

On this basis the calculated results indicate a 41% decrease due to the presence of sulfur compounds, giving a sulfur-free lead susceptibility value of 2.17. Solutizer sweetening reduces the percent decrease to 28%, giving a calculated lead-susceptibility value of 1.56 as compared with the measured value of 1.54.

Influence of Sulfur Content of Components Upon the Lead Susceptibility of Blends

The effect upon lead susceptibility of blending gasolines of high and low sulfur contents was investigated by adding doctor-treated high-sulfur cracked gasoline to Rodessa low-sulfur reformed gasoline. The octane-number and lead-susceptibility values of the two components and of a 50:50 blend are given in table 15.

The lead-susceptibility value for the 50:50 blend is 0.69, which is well below the arithmetic mean of the values for the two components, namely 0.90.

In table 16 and figures 9 and 10 are shown the calculated lead susceptibility values and other data for blends of the two stocks. In the calculations, which were based on sulfur contents, it was assumed that the lead susceptibility values of the two stocks, which were of similar hydrocarbon composition, combine linearly. The calculated value for the 50:50 blend (0.71) is seen to be in close agreement with the measured value.

From the above it is clear that the blending of stocks of high and low equivalent disulfide-sulfur contents will result in a decided loss in lead susceptibility, since the addition of only a small amount of high-sulfur stock will sharply decrease the lead susceptibility of the low-sulfur stock, and, conversely, an excessive quantity of a low-sulfur stock is required to improve significantly the lead susceptibility of a high-sulfur stock.

It should be mentioned that application of this method for calculating lead susceptibility of blends of different sulfur-containing stocks is limited to gasolines having similar hydrocarbon composition. Lead-susceptibility values of sulfur-free stocks of widely different hydrocarbon composition, e.g., cracked and straight-run, do not combine linearly.

Acknowledgment

The author wishes to express his thanks to George W. Waters and H. H. Zuidema for their generous assistance in the development of the relationships presented in this communication, and to K. R. Edlund and Lowrey Love for their supervision during the progress of the work.

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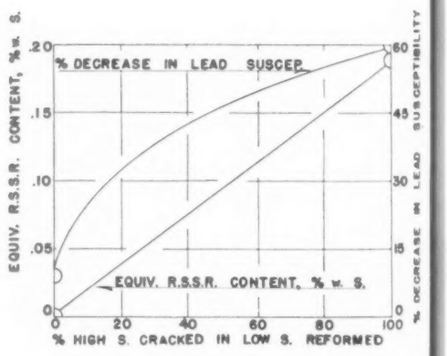

Fig. 9—Effect of blending stocks of high and low equivalent disulfide sulfur content on calculated per cent decrease in lead susceptibility

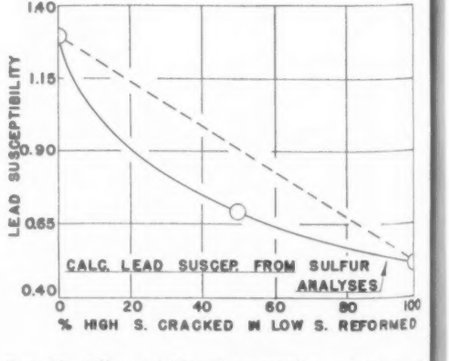

Fig. 10—Effect of blending stocks of high and low equivalent disulfide sulfur content on lead susceptibility

In Defense of Our Patent System

Part 2—Unsound View that a Patent is a "Franchise" Is Back of Numerous Patent System Reform Proposals

By John A. Dienner*

John A. Dienner, Chicago patent attorney, has had wide training and experience in the U. S. Patent System. He has served in U. S. Patent Office, as a member of Patent Law Advisory Committee and other posts closely related to patents. See NPN July 29, p. R-230.

Destructive of the nation's heritage in the present concept of our American Patent System is the "muddied" thinking of the Justice Department and the present U. S. Supreme Court, which would foster the view that a patent is a "franchise", stated John A. Dienner, Chicago, patent law authority, in a recent address before the American Institute of Chemists.

A patent cannot come within the definition of a franchise, which is a right to use the property of someone else under a government warrant, he said. A patent is entirely different, he brings out, being only the right to exclude others from something which they never had, namely, an invention which the patentee produced.

"This mistaken notion that the patent takes something from the public which they have, or that it deprives them of a right which they previously enjoyed, tends to injure the system by giving uninformed persons the view that a patent is the product of government favoritism; that the patentee gets something which he should not have," Mr. Dienner said.

The attitude of the Supreme Court on the question of invention and patents has deteriorated in recent years, he says, quoting the following pronouncement of Justice Douglas: ". . . . That is to say, the new device, however useful it may be, must reveal the flash of creative genius, not merely the skill of the calling. If it fails, it has not established its right to a private grant on the public domain."

"There are two unhappy statements in that quotation," said Mr. Dienner, "first, the concept that a patentable invention or discovery must be the result of a flash of genius; and, second, that a patent is a private grant on the public domain, the franchise theory of the Department of Justice."

The proposals for so-called patent reforms which have recently been placed before Congress arise through mistakes in understanding the fundamental character of patents and nature of inventions, states this authority. He calls upon the patent lawyers, inventors and research engineers to cooperate with the committees of Congress; first to acquaint them with the nature of the problem that confronts Congress in changing the patent law and, second, with what are reasonable methods to accomplish the desired result. Any changes should be made in accordance with American tradition and with the sole purpose of seeing whether such change in the patent system will make it a better and more useful instrument for promoting the progress of science and the useful arts.

The first part of this article was published in the Technical Section of NPN July 29, p. R-229.

Part 2

WHILE I do not mean to say that no improvement can be made in the system of granting and enforcing and utilizing patents, and I will in fact point out certain needed changes, nevertheless, we must constantly defend the system against misconceptions and muddled thinking, as well as against the attack of actual enemies. A great difficulty which friends of the system constantly observe is the failure to understand the basic nature of a patent.

One of the great faults against which we must struggle is the mistaken concept, fostered in recent years by the Justice Department, that a patent is a "franchise". A franchise is a right to use the property of someone else under government warrant. But a patent is nothing of the kind.

A patent is the right to exclude others from something which they never had, namely, an invention which the patentee produced. This mistaken notion that the patent takes something from the public which they have, or that it deprives them of a right which they previously enjoyed, tends to injure the system by giving uninformed persons the view that a patent is the product of Government favoritism; that the patentee gets something he should not have. Unfortunately, the sympathy of unthinking persons is turned against patents and the enforcement of patents is made more difficult. This has reached even, the highest tribunal.

I would respectfully call attention to the fact that the Supreme Court is generally considered by the Patent Bar and business as being inimical to the patent system, and of having exhibited an animosity towards it. To this I cannot wholly subscribe.

It is true that, until within recent months, the Supreme Court had not sustained a single patent for 15 years, and the pronouncement of some of the members of the Supreme Court in those cases in recent months in which patents have been sustained, have come as a distinct shock to those who are familiar with the great benefits of the American patent system and the soundness of its basic principles.

Patent System Misunderstood

The difficulty appears to be that in the government few in high places have a true and correct understanding of the nature of a patent and the true relation of the patent system to the American economic system. We might say epigrammatically: There are few statesmen who are patent lawyers, and there are few patent lawyers who are statesmen.

The attitude of the Supreme Court on the question of invention has undoubtedly undergone deterioration in recent years. Let me refer to the pronouncement of Chief Justice John Marshall in the famous case of Grant vs. Raymond, 31 U. S., page 218, at page 241, in an opinion in which the Supreme Court sustained the granting of a reissue patent, even though the reissue of a patent was not authorized by statute. He said:

> "The public yields nothing that it has not agreed to yield; it receives all which it has contracted to receive. The full benefit of a discovery, after its enjoyment by the discoverer for fourteen years, (now seventeen years) is preserved; and for his exclusive enjoyment of it during that time the public faith is pledged."

The Supreme Court viewed it as a solemn pledge by the public that the law offered the exclusive right in the invention to the inventor in return for his disclosure to the public. And to the solemn performance of this bargain, as

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the great Chief Justice said, "the public faith is pledged".

Let me next call your attention to a decision in 1923 by Chief Justice William Howard Taft, in the famous case of Eibel Process Co. vs. Virginia Paper Co., 261 U. S., page 45, at page 63, in which the Court sustained a patent on a process of making paper, in which the invention consisted merely in changing the inclination of the screen upon which the paper pulp was formed into a web. He said:

> "In administering the Patent Law the Court first looks into the art to find what the real merit of the alleged discovery or invention is and whether it has advanced the art substantially. If it has done so, then the Court is liberal in its construction of the patent to secure to the inventor the reward he deserves."

From those famous pronouncements by judges of the highest legal and judicial attainments, we come to the recent pronouncement of Mr. Justice Douglas, in the case of Cuno Engineering Corp. v. The Automatic Devices Corp., (decided Nov. 10, 1941). He said:

> "We may concede that the functions performed by Mead's combination were new and useful. That does not necessarily make the device patentable. Under the statute the device must not only be new and useful. It must also be an invention or discovery. ° ° ° That is to say, the new device, however useful it may be, must reveal the flash of creative genius, not merely the skill of the calling. If it fails, it has not established its right to a private grant on the public domain."

There are two unhappy statements in that quotation: First, the concept that a patentable invention or discovery must be the result of a flash of genius; and, second, that a patent is a private grant on the public domain, namely, the franchise theory of the Department of Justice.

As to the soundness of Mr. Justice Douglas' pronouncement, we must analyze the difference between his test and the test of the great Chief Justices John Marshall and William Howard Taft.

Chief Justice Marshall Cited

Chief Justice Marshall said that the public faith is pledged, since *the public yields nothing*, and it receives all it has contracted to receive.

The Marshall statement clearly points out that the patent is not a private grant upon the public domain, but it is a grant which takes nothing from the public, but gives the public that which it contracted to receive.

Chief Justice Taft said that the true way of evaluating the patent was to see whether the invention had made substantial advance in the art. That test is the *objective* test. It is the test of whether the invention really contributed something to the art.

The Douglas test of invention is *subjective*. It tests not the invention but the inventor. You can visualize what that would mean. The defendant may well put the inventor on the stand and say, "Why, your Honor, this man does not look as though he ever had a flash of genius in his life."

What has it to do with the nature of the invention whether the man arrived at the result through a "flash of genius" or through the slow plodding of endless toil and sweat? Does it make any difference whether the inventive act smells of the brimstone of the thunderbolt, or whether it smells of the lamp?

Let us refer the question to an expert. I propose the expert. He is Thomas A. Edison. Surely, no man is better qualified to discuss the nature of the inventive act. What did he say?

A solicitous investigator of the nature of "genius" remarked that he thought a genius worked only when the spirit moved him. To this Edison gave the incisive and epigrammatic answer, "Genius is 2% inspiration and 98% perspiration."

After all, we must take even Supreme Court Justices at what they mean and not at what they say. If we interpret Justice Douglas' "flash of genius" in the light of Edison's definition of "genius", we come out not so far from the truth that invention involves 2% cerebral activity and 98% perspiratory activity. The only unbeatable method of making progress is trial and error. Try it and see what happens. Put the question to nature and find out. If that method of arriving at an invention defeats patentability then a new Supreme Court is indicated as necessary.

Objectives of Senate Hearings

Thirty-two years ago when I first cast my lot with the U. S. Patent System I was told in all good faith by those who were well informed that the patent system was so full of defects that it was surely going to be abolished "next year". And I have heard the same repeated at least annually.

Each year I have had less fear of any such dire event, but have grown increasingly confident both as to its fundamental soundness and vitality and also of the need to adapt it to changing conditions.

If we remember that the patent system, substantially in its present form, was established by the Act of 1836, over a hundred years ago, and then consider the vast change in the economic system which has occurred in the U. S., that change being largely occasioned by the benefits of the patent system, it is easy to understand that the practices which were permissible in the more or less pioneer or infant economy, require regulation as a more fully developed economy is attained.

Consider, for example, that in 1836, before the railroads were established, and just about the time the telegraph was invented, there was no such thing as a national market, and no concept of mass production, as we now know it. The corporate form of doing business was not greatly used. The usual business enterprise was small in character and served a geographically limited market.

Progress in the art was slow, and no one held a patent which seriously embarrassed any other competitor, for, with the limited means of distribution, competition was limited. But now that we have a closely knit unitary market, with enormously improved means of transportation and communication, it becomes increasingly necessary to examine the workings of the system to see that the system is actually used for the benefit of the public, as well as for the benefit of the inventor, and that the right of the parties conceived to be established by the original patent laws is actually preserved to them and not perverted to a disadvantageous purpose.

The periodic review of the patent system by the Senate Committee on Patents and the House Committee on Patents is highly desirable, to see that the needs of the public are actually promoted and that no unfair advantage accrues under a system intended to give the benefits of progress to the public and a reward to the inventor.

Particularly in view of the mistaken notion of the Justice Department as to the character of the patent, and the corrective decisions of the Supreme Court in cases where abuses have arisen, the committees of Congress have for some time in the past, and are now interested to discover uses or abuses of the patent system which are anti-social in character.

The particular occasion which has called into being the recent hearings is the relaxation of the patent monopoly in the war effort. The President correctly realizes the war powers which his office carries, and has advised the public and Congress that not only would foreign patents be seized, but that rights under U. S. patents necessary to the war effort are also subject to seizure as is any other property.

The Senate committee thereupon being relieved of the immediate necessity of legislation looking to preventing the execution of war measures by patent holders stated to the press that it would have time for a long range revision of the patent laws.

The Senate committee then proceeded to examine various phases of the patent laws, and particularly whether or not seizure of patents under certain circumstances is desirable, or the granting of compulsory licenses is desirable, or whether anti-trust measures should be written into the patent laws, etc. The hearings have not been as illuminating or constructive as they have been sensational.

In its search to discover anti-social uses of patents or the exercise of patent rights in an anti-social manner, the Standard Oil Co., in respect to rubber manufacture, and the General Electric Co., in respect to Carboloy manufacture, have been held to public scorn for having entered into agreements with German companies in respect to interchange of patent rights.

It is my information that these contracts were made in peacetime and were normal contracts made in good faith. With the advent of war, there was unfortunately no power on the part of the contracting parties to void or dissolve the contracts. While the state of war made it impossible, and in fact illegal to communicate with the other parties, nevertheless the contract presumably remains in force, and becomes effective again in peacetime.

The Senate might well relieve the situation by permitting such a contract to be unilaterally cancelled in the event of war or national emergency.

However, there was revealed a thought which is new and that is, that a company such as Standard Oil Co. or General Electric or any other company or individual which, by its

own voluntary agreement renounces the development in the U. S. of any commodity, facility or process which is or is likely to be of service to the people of the U. S. in war time, is derelict in its duty to the public.

The principle presupposes an obligation upon the private corporation, for such Standard Oil Co. and General Electric Co. still are, as well as upon the individual, to safeguard the interest of the people at large by not disabling itself in respect of the production of any commodity or the performance of any process which is or may be of general utility to the nation in times of war or public danger.

That principle is undoubtedly sound, but it requires careful examination, definition and promulgation, so that a repetition of the situation shall not again arise. There is the underlying philosophy of the obligation of any citizen or corporation not to assume any position or to do any act which is anti-social or contrary to the public interest.

It would, obviously, be anti-social or against the public interest, for a person or corporation having the exclusive right to perform a certain process or to produce a certain commodity to disable itself by agreement with a foreign corporation and thereby suppress the establishment of production machinery in lines which becomes important in war.

The Senate committee has, in introducing S-2491, rehashed some of the concepts of the monopoly committee (TNEC), which in my judgment were repudiated by the Congress, by the public, and by the Patent Bar at the close of the monopoly hearings.

Among other policies is that which has been proposed under a mistaken understanding of its nature of the limitation to be put upon licenses; namely, that no one shall grant a license which is limited in respect of the number of devices to be made thereunder, the field of use of the invention, the price at which articles covered by the patent may be sold, or the territory in which the license is operative.

It is my conviction that the Department of Justice has made these recommendations based upon misinformation as to the nature of the patent grant, just as I believe Justice Douglas was misinformed in designating patentable inventions solely as the product of a flash of genius, and in considering a patent as "a private grant upon the public domain".

Necessity for Cooperation

I have pointed out above my belief that many of the proposals which come before the patent committee of the House or of the Senate arise through mistakes in understanding of the fundamental character of patents and the nature of inventions, etc. Now it is the duty of the interested public to inform the Committees of Congress. Since the patent profession, inventors, and research engineers are peculiarly the only ones acquainted with the intricacies of the Patent Law, it is an obligation upon them to cooperate with the Committees of Congress, first, in the educational process of acquainting them with the nature of the problem which confronts us, and, second, what are reasonable methods of accomplishing the desired results.

Do not be alarmed by the fear that every bill which is introduced in the House or in the Senate will immediately become law from the mere fact of its having been introduced. The legislative process does not work that way.

Any bill which is introduced is referred to the appropriate committee which will, time permitting, hold hearings upon the particular bill, if there is any demand for its passage. Where the bill is the product of the committee's own work, the committee is peculiarly anxious to obtain information.

The way in which committees of Congress gain information is frequently to introduce a bill which calls for a remedy of far wider scope than is really contemplated. For example, the way to find out about the patent system is to introduce a bill to abolish the patent system. Then at the hearings on the bill all those who can inform the committee will appear and give testimony as to the value of the System, etc., and the committee thereby becomes informed as to the nature of the problem and the methods by which it may be solved.

It is the duty of those who are informed to oppose measures which are improper or will produce the wrong results, or which are otherwise uncalled for, and on the reverse side of the picture, it is the duty to inform Congress of the needs of the country so far as they are known and recognized.

Viewpoint Clouded

The great difficulty appears to be that the patent lawyers, engineers and research workers do not have a comprehensive view of the economic system and the place which the patent law and the system of patents play in that economic picture. On the contrary, the members of Congress are informed of the broad economic picture, and they are at times unable to analyze and resolve the proper operation of the patent system. Obviously, it is difficult properly to evaluate its needs from an imperfect understanding of its nature.

In respect of the bills now pending before Congress, S-2303 should be opposed. It is unfair to the patentee.

S-2491 should be opposed. It provides for a method of granting compulsory licenses which is not well thought out. Also it purports to prohibit any limitations on licenses granted under patents, and provides for the recording of assignments and licenses with the Federal Trade Commission. It cures no genuine anti-social situation.

S-2438 is thoroughly bad. It is a corporation licensing bill and provides severe penalties for any wrongful use of a patent, and also proposes to eliminate any restrictions in licenses to be granted under patents. It also fails to meet any need or to solve any problem which would advance the usefulness of the patent system, or outlaw any present abuse which the courts do not now have power to stop.

All proposals to grant compulsory licenses heretofore have rested upon the proposition that, where a man refuses to manufacture something under his patent, or does not manufacture enough to satisfy the public, a rival may step in and demand that he be permitted to share the market by working under the patent.

It is remarkable that no testimony establishing any such situation has been brought to the attention of Congress, nor was it brought to the attention of the monopoly committee. The fact is, such a situation is largely self-corrective. Of course, if such a condition did exist, by virtue of foreign ownership of a patent, coupled with refusal to grant any licenses, and theoretically that is possible, a Compulsory License Act based upon that proposition of law would not be objectionable. But it should be confined, it seems to me, to cases of admitted or proven abuse, and not to theoretical cases which never have existed.

Eminent Domain Concept

A much more important concept is that which would permit the U. S. Government to exercise the right of eminent domain over a patent in any one of the following three instances:

(1) in the case of any patent covering devices required in time of war or national danger;

(2) any patent covering devices intended for national defense;

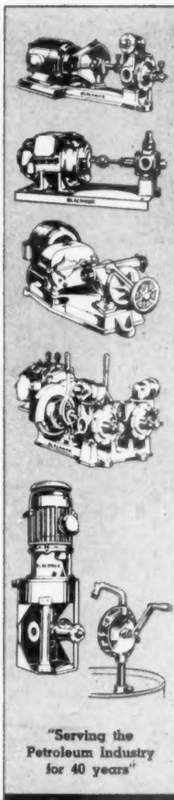
(3) any patent covering devices charged with a genuine public interest. In brief, if we stick to the proposition that, when an invention or the product thereof is charged with a public interest, it may, upon a proper showing, be condemned, or the use thereof condemned, for the benefit of the public, as a public convenience and necessity. We can follow rules of law long established for property in general.

In regard to the abuses of patents in restraint of trade or tying-in clauses or the like, the Sherman Act and the Clayton Act, and the decisions of the Supreme Court, are a satisfactory guide for anti-trust action. After all, the patent is an innocent and harmless device in itself, and the mere misuse of it or the use of it to commit an unlawful act in no way contaminates the patent nor contaminates the system under which it was granted.

If any anti-trust legislation is necessary, it should rest upon its own merit, and not consist in the destruction of a segment of the patent system.

The Supreme Court has laid down clear lines as to what constitutes the abuse of patents, as in taking the royalty on something outside the monopoly of the patent, or in controlling unpatentable materials, supplies, etc. The principles covered by these Supreme Court decisions are clear and leave no one in doubt. Legislation in this direction is not necessary. No need for the same has been made out at the hearings, nor at any hearings with which I am familiar.

The American patent system has served us well. It is fundamentally sound, and it is far superior to the patent system of any other country. If any change requires to be made in it, it should be made in accordance with the American tradition, and with the sole purpose in mind of seeing whether such change will make it a better and more useful instrument in promoting progress of science and the useful arts. That is the true test. Any proposed change which does not meet the test should be decisively rejected.



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INDEX TO ADVERTISERS

Technical Section

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American Meter Co.

Badger & Sons Co., E. B.

Blackmer Pump Co. R-292

Brooks Equipment & Mfg. Co.

Erie Bolt & Nut Co. R-276

Kellogg Co., M. W. R-267

Kimble Glass Co.

Lummus Co.

Monsanto Chemical Co. R-283

Petroleum Rectifying Co. of Calif. R-262

Phillips Petroleum Co.

Sun Shipbuilding & Dry Dock Co. R-281

Taylor Instrument Companies

Universal Oil Products R-273

Contents

Technical Section

★

AUGUST 26, 1942

Oil Products for Many War Needs Will Come From the Refinery Conversion Program . . R-247

Scarce Materials Saved in Many Ways in Wartime Refinery Construction R-251

Reclamation Projects Standardized to Save Working Time and Money R-253

Converting Standard Compressors For Service in Butadiene Plants—By B. C. Thiel R-254

How Shell Saved 6000 H. P. in New Compressors In Expanding Its Aviation Gasoline Plants R-256

War Emergency Specifications Are Proposed For Refinery Bolting To Conserve Alloys R-257

How to Design a War Refinery Manifold That Conserves Materials R-260

New Processes Bring Pumping Problems In Wartime Refining Plants—By Drew T. Whiting, K. P. Hurley R-262

Wartime Substitutes for High-Alloy Steels for Refinery Service—By A. Grodner R-266

Acetylene and Other War Chemicals Made from Petroleum by New Process . . R-270

Crude Naphtha Stabilizer Performance—By J. G. McGiffin R-277

Influence of Sulfur Compounds on Gasoline Octane Number and Lead Susceptibility. Part II—By Julian G. Ryan R-286

In Defense of Our Patent System. Part II —By John A. Dienner R-289